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ysical Constants of Hydrocarbon

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PHYSICAL CONSTANTS OF HYDROCARBONS

Volume IV
POLYNUCLEAR AROMATIC HYDROCARBONS

GUSTAV EGLOFF

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UNIVERSAL OIL PRODUCTS COMPANY
RESEARCH LABORATORIES
CHICAGO, ILLINOIS



American Chemical Society
Monograph Series

REINHOLD PUBLISHING CORPORATION
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1947

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Dedicated to
JOSEPH G. ALTHER

GENERAL INTRODUCTION

American Chemical Society Series of Chemical Monographs

By arrangement with the Interallied Conference of Pure and Applied Chemistry, which met in London and Brussels in July, 1919, the American Chemical Society was to undertake the production and publication of Scientific and Technologic monographs on chemical subjects. At the same time it was agreed that the National Research Council, in cooperation with the American Chemical Society and the American Physical Society, should undertake the production and publication of Critical Tables of Chemical and Physical Constants. The American Chemical Society and the National Research Council mutually agreed to care for these two fields of chemical development. The American Chemical Society named as Trustees, to make the necessary arrangements for the publication of the monographs, Charles L. Parsons, secretary of the Society, Washington, D. C.; the late John E. Teeple, then treasurer of the Society, New York; and the late Professor Gellert Alleman of Swarthmore College. The Trustees arranged for the publication of the A.C.S. series of (a) Scientific and (b) Technologic Monographs by the Chemical Catalog Company, Inc. (Reinhold Publishing Corporation, successors) of New York.

The Council of the American Chemical Society, acting through its Committee on National Policy, appointed editors (the present list of whom appears at the close of this introduction) to select authors of competent authority in their respective fields and to consider critically the manuscripts submitted.

The first monograph of the series appeared in 1921. After twenty-three years of experience certain modifications of general policy are indicated. In the beginning there still remained from the preceding five decades a distinct though arbitrary differentiation between so-called "pure science" publications and technologic or applied science literature. This differentiation is fast becoming nebulous. Research in private enterprise has grown apace and not a little of it is pursued on the frontiers of knowledge. Furthermore, most workers in the sciences are coming to see the artificiality of the separation. The methods of both groups of workers are the same. They employ the same instrumentalities, and now frankly recognize that their objectives are common, namely the search for new knowledge for the service of man. The officers of the Society therefore have combined the two editorial Boards in a single Board of twelve representative members.

Also in the beginning of the series, it seemed expedient to construe rather broadly the definition of a monograph. Needs of workers had to be recognized. Consequently among the first one hundred monographs appeared works in the form of treatises covering in some instances rather broad areas. Because such necessary works do not now want for publishers, it is considered advisable to hew more strictly to the line of the monograph character which means more complete and critical treatment of relatively restricted areas, and where a broader field needs coverage, to subdivide it into logical sub-areas. The prodigious expansion of new knowledge makes such a change desirable.

These monographs are intended to serve two principal purposes: first, to make available to chemists a thorough treatment of a selected area in form usable by persons working in more or less unrelated fields to the end that they may correlate their own work with a larger area of physical science discipline; second, to stimulate further research in the specific field treated. To implement this purpose the authors of monographs are expected to give extended references to the literature. Where the literature is of such volume that a complete bibliography is impracticable, the authors are expected to append a list of references critically selected on the basis of their relative importance and significance.

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Preface

The principal source of polynuclear aromatic hydrocarbons is coal-tar. Some of these compounds are also found in petroleum and other natural sources, and many are produced synthetically. Commercial utilization of these hydrocarbons has been confined essentially to the dyestuff industry. Among the polynuclears are compounds of physiological interest such as the carcinogenic or cancer producing hydrocarbons.

Volume IV is a collation of all melting point, boiling point, density, and refractive index data available on polynuclear aromatic hydrocarbons. This survey shows that the opportunities for research on polynuclear aromatics are far from being exhausted. The thousands of known compounds represent only a small fraction of the theoretical possibilities. The physical data on the known compounds are so scanty that there is a great need for investigation of the physical constants of polynuclears.

We are indeed grateful to the staff of John Crerar Library for valuable guidance in the location of material and for privileges granted in connection with use of the outstanding facilities of this institution.

Deep appreciation is hereby expressed for the assistance of the Universal Oil Products Company and the author's colleagues, Mary Alexander, Nancy Corbin, M. S. Beyt, and Madge Spiegler, in this collation and critical study of the physical constants of aromatic hydrocarbons.

GUSTAV EGLOFF

Chicago, Ill.,
March 1, 1946

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INTRODUCTION

Foreword

The fourth volume of Physical Constants of Hydrocarbons is a collation and evaluation of the physical constants of polynuclear aromatic hydrocarbons. The compounds included under this classification are fused ring hydrocarbons having at least one aromatic ring.

The study conducted for this volume is a continuation of that made for Volume III.¹ References through April, 1945 were added to those collected concurrently with material for the previous volume. Details concerning the extent of literature coverage are explained in the Introduction to Volume III.

Although thousands of polynuclear aromatic hydrocarbons have been prepared, these compounds represent only a minor fraction of the theoretical possibilities. A great number of the larger polynuclears have been synthesized in recent years particularly in connection with cancer research and other physiological problems.

The present study also shows that the published data for many of the known compounds are insufficient for the identification of these compounds on the basis of physical properties alone. Identification of the carcinogenic and other higher polynuclear hydrocarbons has been markedly facilitated by the study of their ultraviolet, infrared, and Raman spectra.

Critical evaluation of the data in Volume IV was limited by the paucity of data available from the literature. Fewer constants have been determined for the polynuclear aromatics than for the mononuclear aromatics and consequently, the tabulations in this volume are not made with the discrimination possible in Volume III. For example, in Volume IV, melting ranges of over 2° and boiling ranges greater than 5° have been recorded for many compounds because these figures were the only ones available. Likewise, refractive index and density values for which temperature conditions were not stated in the literature appear in Volume IV. Many of these values have apparently been determined on the compound in the solid state, but a notation of the state of aggregation is included in the tabulations only when verified by the reference.

The methods used in the calculation of the most probable values of constants are described in the Introduction of Volume III. The lack of data for the polynuclear aromatics makes it impossible to calculate "best values" for many of the compounds. Only melting point data are available on the greater portion of the polynuclears. Boiling point, density, and refractive index values have been determined for only a very few polynuclears and in most cases the number of values determined is too small to permit the calculation of constants of equations representing them.

¹ Egloff, G., "Physical Constants of Hydrocarbons," Volume III, Reinhold Publishing Corporation, New York, 1946.

Nomenclature

Inasmuch as the nomenclature used for the polynuclear aromatic hydrocarbons in Volume IV does not rigidly follow any previously described system, it will be explained in the following discussion. "The Ring Index"¹ provides the only system sufficiently developed to permit the naming of the nuclei of all polynuclear hydrocarbons. Primarily an attempt is made to conform to these rules, but complications arising in the nomenclature of many derivative compounds necessitate departures from this system. Although the present study gives much evidence for the desirability of an entirely new system, the terminology herein is confined to that already in use. The nomenclature of this volume is also chosen with the intention of offering pictures of the structure which may be readily visualized.

A nomenclature system of basically different character has been proposed by Van Arsdell and Egloff,² and another was partially elucidated by Clar.³ Both of these systems provide methods for simplifying problems of nomenclature, but neither is broad enough in scope to be applied to all compounds. The previously mentioned systems are compared in Table I.

The nomenclature proposed by either Van Arsdell and Egloff or Clar is more scientifically systematic than that of Patterson or that used in this volume. In the Van Arsdell and Egloff system, the general term *-zene* prefixed by the appropriate Greek numerical term designates a straight row of fused rings and, when further prefixed by *iso-*, a fused structure of the phenanthrene type. Clar makes use of the general term *-acene*, with the appropriate prefix, to designate straight row fusions and the term *-phene* for phenanthrene type structures. By using Roman numerals to designate the number of rings in each row, Clar's system can be extended to include compounds having one or more rings fused at an angle. According to Van Arsdell and Egloff, *peri*-fusions, as shown in example six, are defined by prefixing *peri-* to the *-zene* name. Despite the advantages of these systems, classical names such as phenanthrene, anthracene, and naphthacene are used in this volume to facilitate its use by scientists who are accustomed to thinking in terms of these names.

The use of letters to denote ring fusions, a point at which the present volume diverges from Patterson and Capell, will be treated in detail under a discussion on numbering and lettering. In a few cases, the basic names preferred by these authors are objectionable. Essentially different ones, therefore, are used. For example, the name "benzonaphthene," given to compound No. 6 in Table I, is scientifically ambiguous because the term "naphthene" is used indiscriminately throughout the literature to refer to several compounds and to a class of compounds.

In order to classify the compounds and name them with any degree of con-

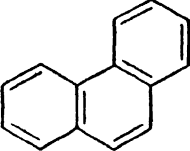
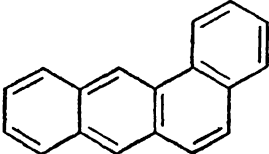
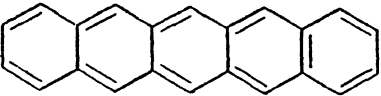
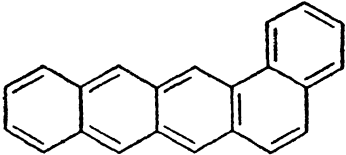
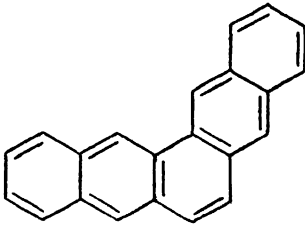
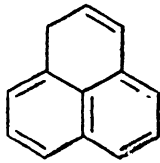
¹ Patterson, A. M., and L. T. Capell, "The Ring Index," Reinhold Publishing Corporation, New York, 1940.

² Van Arsdell, P. M., and G. Egloff, "Nomenclature of Cyclic Hydrocarbons," paper presented before the American Chemical Society, Atlantic City, September, 1941.

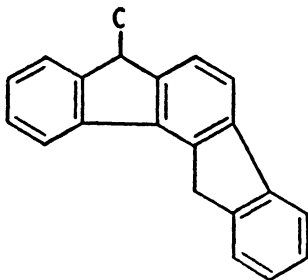
³ Clar, E., "Aromatische Kohlenwasserstoffe," Springer-Verlag, Berlin, 1941.

sistency, the name given in the literature is disregarded in many instances. Frequently the literature name bears no relation to the structure, is misleading,

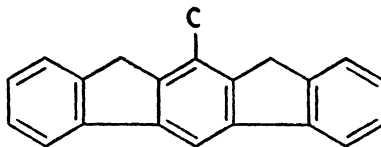
TABLE I

	Name used in Volume IV	Patterson	Egloff & Van Arsdell	Clar
1. 	Phenanthrene	Phenanthrene	Isotri- zene	Triphene
2. 	1,2-Benzo- anthra- cene	Benzo [a]- anthra- cene	Isotetra- zene	Tetra- phene- (I, II)
3. 	Pentacene	Pentacene	Penta- zene	Pentacene
4. 	1,2-Benzo- naphtha- cene	Benzo[a]- naphtha- cene	Isopen- tazene	Penta- phene- (I, II)
5. 	2,3,6,7-Di- benzo- phenan- threne	Dibenzo- [bh]- phenan- threne		Penta- phene- (II, II)
6. 	Phenalene	Benzo- naph- thene	Peritri- zene	

or actually defines the compound incorrectly. The names "phthalacene" and "isophthalacene," for example, give no clue to structure.

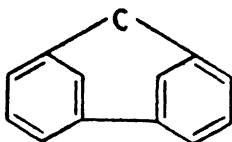
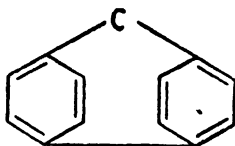


Phthalacene

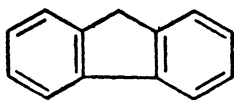
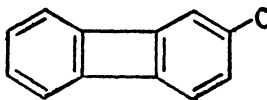


Isophthalacene

The many names assigned throughout the literature to fluorene and its derivatives provide illustrative examples of faulty nomenclature. Fluorene is often called "diphenylenemethane," a term applicable to more than one compound. The following structures, with which fluorene might be confused if named "diphenylenemethane", are also reported.¹ When the name "di-

 γ -Methylenediphenylene δ -Methylenediphenylene

phenylenemethane" is qualified by *o*-, *m*- or *p*- it has structural significance, but even then may be confused with "methylbiphenylenes" which have also been called "diphenylenes."

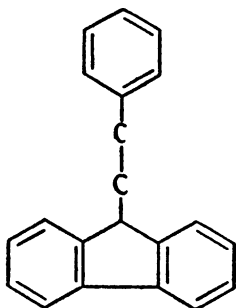
Fluorene or
o-Diphenylenemethane

2-methylbiphenylene

The diphenylene terminology is particularly misleading when used in reference to fluorene derivatives. The following compound, which is named

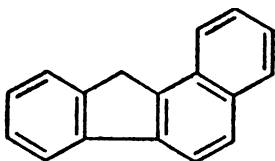
¹Carnelley, T., J. Chem. Soc. **37**, 701 1880.

σ -phenethylfluorene in this volume, can be named as an ethane or propane according to the various methods of notation found in the literature:

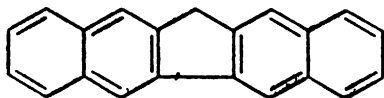


1-Diphenylene-3-phenylpropane
 α -Diphenylene- γ -phenylpropane
 or
 1-(9'-Fluoryl)-2-phenylethane
 α -9-Fluoryl- β -phenylethane

Among the incorrectly used names are chrysofluorene and dinaphthofluorenes. These terms imply a chryso- and two naphtho-fusions, respectively, on fluorene but are used almost exclusively in reference to benzo- and dibenzofluorenes.

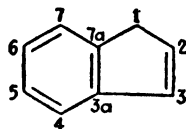


Chrysofluorene
 α -Naphthofluorene
 1,2-Benzofluorene

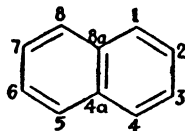


β,β -Dinaphthofluorene
 2,3,6,7-Dibenzofluorene

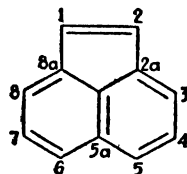
The explanation of the nomenclature used in the present study begins with consideration of nuclear structures. The following compounds with the indicated numbering are used as standard nuclei from which more complicated structures are built:



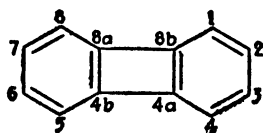
Indene
 (2,3-dihydro form: Indane)



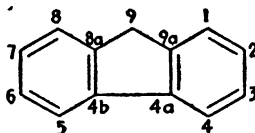
Naphthalene



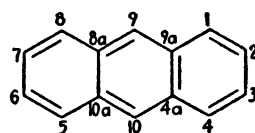
Acenaphthylene
 (1,2-dihydro form: Acenaphthene)



Biphenylene

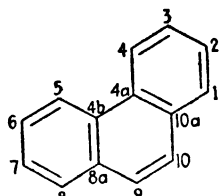


Fluorene

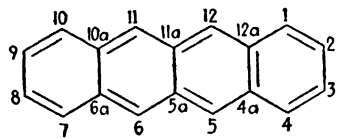


Anthracene

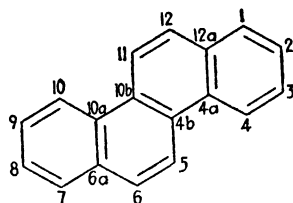
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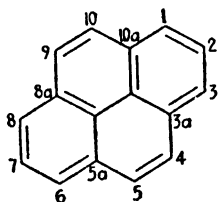
Phenanthrene



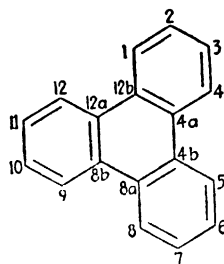
Naphthacene



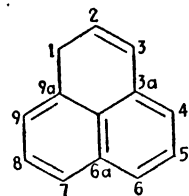
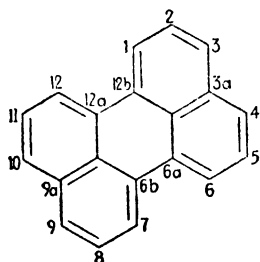
Chrysene



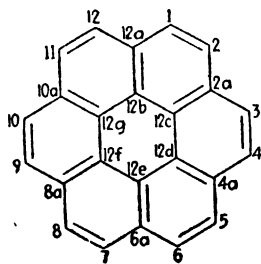
Pyrene



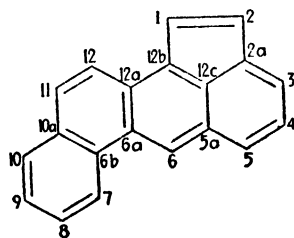
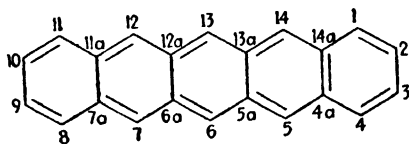
Triphenylene

Phenalene
(2,3-dihydro form:
Phenalan)

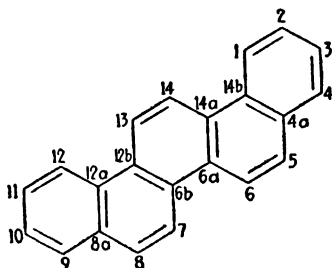
Perylene



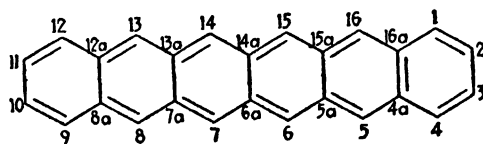
Coronene

Cholanthrylene
(1,2-dihydro form:
Cholanthrene)

Pentacene

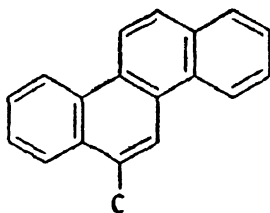


Picene



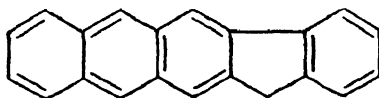
Hexacene

The least hydrogenated forms are considered parent except for the specified dihydro forms of indene, acenaphthylene, phenalene, and cholanthrylene. The largest of these nuclei contained in a given compound is considered as the nuclear structure of that compound. For example, the following structure is named 6-methylchrysene in preference to 1,2-benzo-3-methylphenanthrene.



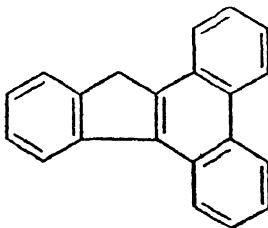
6-Methylchrysene

Because anthracene is a larger nucleus than fluorene, 2,3-(3',2'-indo)-anthracene rather than 2,3-(3',2'-naphtho)-fluorene is assigned to the following structure.



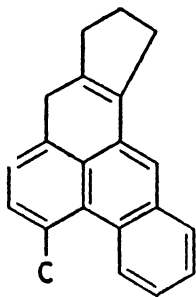
2,3-(3',2'-Indo)-anthracene

Exception to this ruling is made, however, when the exception results in a decided simplification of the name. Prime numbering, for example, can be eliminated by naming the following structure 1,2,3,4-dibenzofluorene instead of 9,10-(2',3'-indo)-phenanthrene.



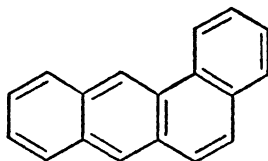
1,2,3,4-Dibenzofluorene

Likewise, 2,3-cyclopentano-5,6-benzo-7-methylphenalene includes only one set of numbers while cyclopentano-[a]-(6'-methylbenzo)-[de]-3-hydroanthracene necessitates the use of letters and two sets of numbers.



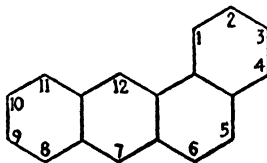
2,3-Cyclopentano-5,6-benzo-7-methylphenalene

When two parent nuclei of the same size are possible, the one having the greatest number of rings in a horizontal row is chosen as the parent nucleus. For example, 1,2-benzoanthracene is preferred to 2,3-benzophenanthrene.



1,2-Benzoanthracene

Many authors number compounds such as 1,2-benzoanthracene with a single set of numbers.

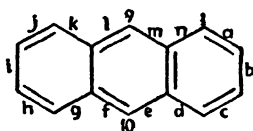
1,2-Benzoanthracene¹

Although this system is advantageous in many respects, it brings in complications when derivative compounds are named. According to this plan, a methyl radical substituted on the benzo group has the number 2-, 3-, or 4- which is ambiguous because 1- and 2- are also used to describe the position of the benzo group on anthracene.

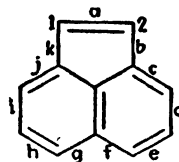
The positions of fused substituents cannot be indicated by numerical notations with simplicity when more than one side of the substituent is common to the parent nucleus. In these cases, letters designate the sides of fusion. The letter "a" represents the side between the 1- and 2-positions, "b" the next side

¹ Patterson, A. M., and L. T. Capell, "The Ring Index," Reinhold Publishing Corporation, New York, 1940.

of the formula and so on in alphabetical order. The positions described by letters are illustrated in the following:

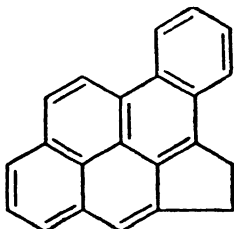


Anthracene



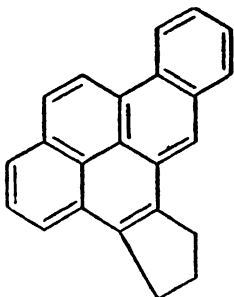
Acenaphthylene

When a compound has two or more fused substituents, only one of which can be designated by numbers, letters are used for all.



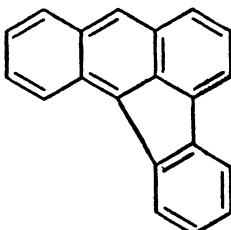
Benzo-[a]-cyclopentano-[cd]-pyrene
not
1,2-Benzocyclopentano-[cd]-pyrene

When all fused substituents are fused to only one side of the nucleus, the positions are indicated by numbers rather than letters.

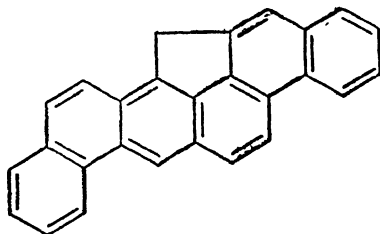


1,2-Benzo-4,5-cyclopentanopyrene
not
Benzo-[a]-cyclopentano-[e]-pyrene

All fused substituents other than benzene which require the use of letters, must have a second series of letters or a set of numbers to indicate the positions of carbons relative to the substituent itself. These positions are stated in numbers and are inscribed within brackets preceding the letters used to designate the position of fusion on the nucleus as illustrated in the following examples.

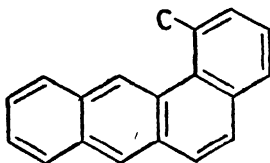


Indo-[3,2,1-de]-anthracene

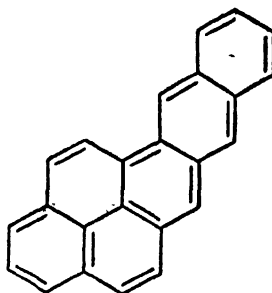


Naphtho-[3,2,1-bc]-cholanthrene

All numbering and lettering is clockwise except for a few instances which will be explained later.¹ The initial point of numbering on the substituent nucleus is situated so that the carbon atoms common to both the parent and substituent nuclei have the lowest possible numbers consistent with standard numbering. Thus the nomenclature for the following structures is:

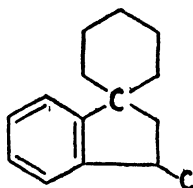


1,2-(3'-Methylbenzo)-anthracene
not
6,7-(3'-Methylbenzo)-anthracene



1,2-(3',2'-Naphtho)-pyrene
not
6,7-(3',2'-Naphtho)-pyrene

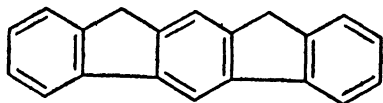
For spiro compounds, essentially the same rules apply and the spiro atom is assigned the lowest possible number.



Spiro [3-methylindane-1,1'-cyclohexane]
not
Spiro [1-methylindane-3,1'-cyclohexane]

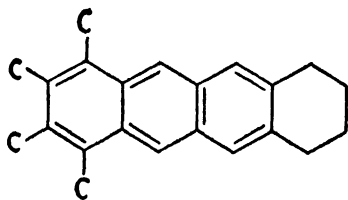
Counterclockwise numbering is used for substituent nuclei when clockwise numbering involves a change in the standard numbering. For example, the use of clockwise numbers for the indo-substituent of 2,3-(2',3'-indo)-fluorene would involve numbering the saturated carbon as 3'- rather than 1'-, the standard position.

¹ See Patterson and Capell, "The Ring Index" p. 24. The formula for 7-benz-[de]-anthracene is numbered clockwise but lettered counterclockwise. Many examples similar to this are found in the names of preference given in "The Ring Index."



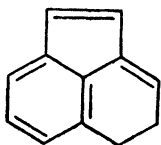
2,3-(2',3'-Indo)-fluorene

The principle of assigning the lowest possible numbers or letters to substituents is followed in this volume as it is for the mononuclear aromatics. For detailed explanation of alkyl and alicyclic derivatives, see the Introduction to Volume III. The problems encountered in numbering the various nuclei of this volume complicate somewhat the general application of the system used for the mononuclears. The nuclear systems must be numbered in accordance with the previous discussion before the rules for using lowest possible numbers are applied. In this volume, there is an exception to this rule. When a partially hydrogenated nuclear structure can be numbered from more than one starting point, the hydrogenated positions are always assigned the lowest numbers. In the naming of the compound, these hydrogen atoms are designated immediately preceding the name of the nuclear structure even though the numbers referring to other substituents are higher.



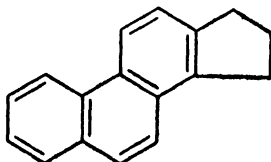
7,8,9,10-Tetramethyl - 1,2,3,4-tetrahydro-
naphthalene
not
1,2,3,4-Tetramethyl - 7,8,9,10-tetrahydro-
naphthalene
nor
1,2,3,4-Tetrahydro - 7,8,9,10-tetramethyl-
naphthalene

This rule is not followed, however, when assignment of lowest numbers to the hydrogen atoms involves changing of the standard numbering of a ring system.



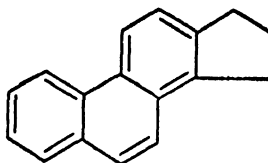
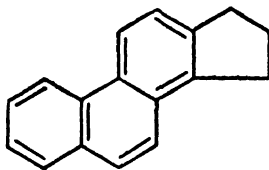
4,5-Dihydroacenaphthylene
not
1,2-Dihydroacenaphthylene

Frequently in the literature, a cyclane fused to an aromatic nucleus was named as a cycleno-compound. Although the side common to the nucleus and the substituent has, at least in some of the resonance structures, a double bond, the substituent is called cyclano- in this volume. For example, the following structure is named 1,2-cyclopentanophenanthrene even though it is frequently referred to as a 1,2-cyclopentenophenanthrene in the literature.



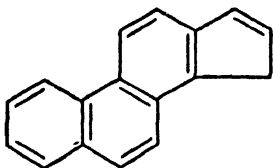
1,2-Cyclopentanophenanthrene

Assuming other resonance structures of phenanthrene, a double bond will not always exist on the common side.



Two other resonance structures for 1,2-Cyclopentanophenanthrene

By naming the five carbon ring cyclopentano-, confusion is avoided with such structures as 1,2-(cyclopenten-3'-o)-phenanthrene.

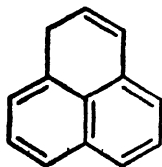


1,2-(Cyclopenten-3'-o)-phenanthrene

If cyclopenteno- were used for the former structure, cyclopentadieno- would necessarily be used for the latter.

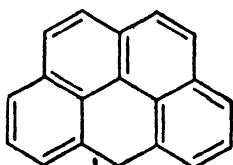
The notation of all possible resonance structures is not practical for this publication. Inclusion of double bonds in the formulae, however, is necessary to indicate the extent of saturation. Double bonds are, therefore, assigned arbitrarily in order to distinguish partially hydrogenated compounds from the others.

Peri-fused benzene ring structures, of which phenalene is the simplest, always have one saturated carbon atom.



Phenalene

In this study, the name given to such compounds, except for those included in the list of nuclear structures, specifies the saturated carbon atom by prefixing the appropriate number to -hydro-. For example, the following compound is named benzo-[cd]-5-hydropyrene.



Benzo-[cd]-5-hydropyrene

Order of Tabulating Compounds

The order used for the tabulation in this volume will be explained to facilitate the location of compounds. Constants have been determined on a wide variety of nuclear structures and derivatives thereof. For only a few nuclear structures, however, have sufficient derivatives of one type (*i.e.* alkyl, alkenyl, phenyl, diphenyl, etc.) been prepared to warrant the classification of these into a separate section. Consequently, a highly arbitrary system is devised for the classification and the order of listing compounds.

All compounds having a common empirical formula are classified in one group. These groups are numbered with Roman numerals and listed in order of decreasing hydrogen content. All compounds of empirical formula C_nH_{2n-8} , for example, are tabulated under I; compounds of formula C_nH_{2n-10} are listed under II, etc.

Groups I through XV are divided into sections denoted by Arabic numerals. These subdivisions are made when a lengthy series of compounds having a single nuclear structure or very similar nuclear structures is found. The section including the smallest nuclear structure is tabulated under 1., the next under 2., etc. Thus under Group VII are listed:

1. Indene derivatives of empirical formula C_nH_{2n-20} .
2. Naphthalene derivatives of empirical formula C_nH_{2n-20} .
3. Cyclanoanthracenes and their alkyl derivatives.
4. Cyclanophanthrenes and their alkyl derivatives.
5. Miscellaneous polynuclears of empirical formula C_nH_{2n-20} .

When nuclei of two or more sections are of the same size, the section composed of derivatives of the nucleus having the longest straight row of rings precedes the others. Under Group IX, for example, section 5 is naphthacene and its alkyl derivatives, section 6 is chrysene and its alkyl derivatives, etc.

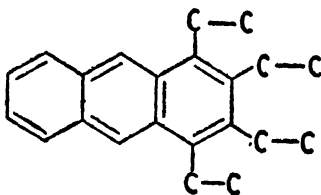
Except for sections entitled miscellaneous and a few sections in which general classification is simplified by listing together such similar compounds as anthracene and phenanthrene derivatives, the compounds of one section have a common nucleus. The compounds are listed in these sections:

1. In increasing order of carbon content, *i.e.* C_{12} compounds precede C_{13} compounds etc.
2. In order of increasing number of substituents, *i.e.* propyl precedes methyl plus ethyl which precedes trimethyl.
3. In order of increasing complexity of substituents, *i.e.* *n*-butyl precedes *sec*-butyl which precedes *tert*-butyl. For more detailed explanation see Introduction to Volume III.
4. In order of increasing numerical sum of the numbers describing substituent positions, *i.e.* 2,3,5-trimethylnaphthalene precedes 1,2,8-trimethylnaphthalene. If the sum is equal, the compound bearing the lowest number is placed first, *i.e.* 1,4-dimethylnaphthalene precedes 2,3-dimethylnaphthalene.

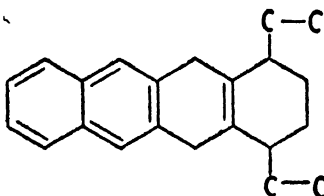
The order of tabulating compounds in the miscellaneous groups or sections

is more complicated. These hydrocarbons are listed primarily in order of increasing carbon content. After this qualification has been fulfilled, the general order follows:

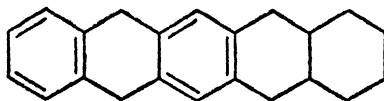
1. In order of increasing number of rings, *i.e.*, anthracene derivatives precede hexahydronaphthacene derivatives which precede decahydropentacene etc.



(1) 1,2,3,4-Tetraethylanthracene

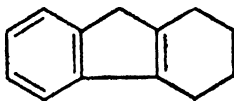


(2) 1,4-Diethyl-1,2,3,4,5,12-hexahydronaphthacene

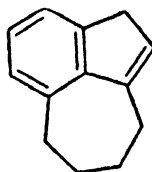


(3) 1,2,3,4,4a,5,7,12,14,14a-Decahydropentacene

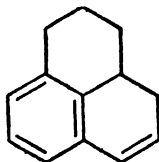
2. In order of increasing size of rings, *i.e.* a compound having one five- and two six-membered rings precedes one having one five-, one six-, and one seven-membered rings which precedes one having three six-membered rings.



(1) 1,2,3,4-Tetrahydrofluorene (1-5C and 2-6C rings)

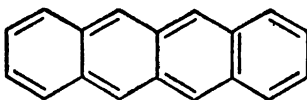


(2) Cycloheptano-[cd]-indene (1-5C, 1-6C and 1-7C rings)

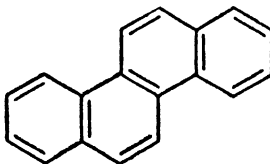


(3) 3a,4-Dihydrophenalan (3-6C rings)

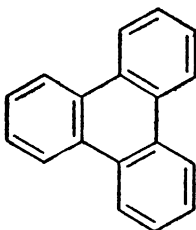
3. In order of increasing number of rings fused at angles, *i.e.*, naphthacene precedes chrysene which precedes triphenylene, etc.



(1) Naphthacene



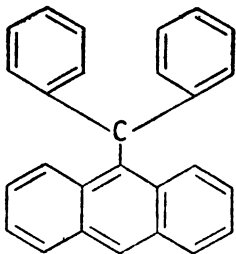
(2) Chrysene



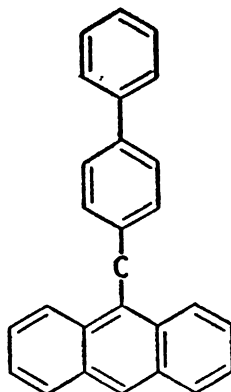
(3) Triphenylene

The foregoing general principles, however, are not sufficient for determining order in every case. Further discussion follows to clarify special problems which arise after the general principles have been followed.

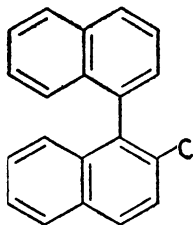
Benzhydrylpolynuclears precede polynuclear biphenylmethane. For example, 9-benzhydrylanthracene precedes 9-anthryl-*p*-biphenylmethane.



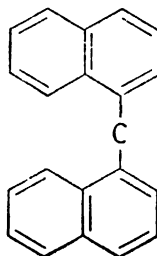
(1) 9-Benzhydrylanthracene

(2) 9-Anthryl-*p*-biphenylmethane

Biaryls are listed preceding diarylaliphatics, *i.e.*, 2-methyl-1,1'-binaphthyl precedes di-1-naphthylmethane.

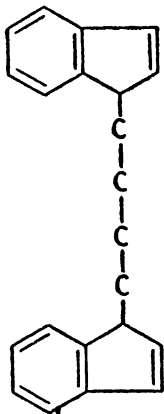


(1) 2-Methyl-1,1'-binaphthyl

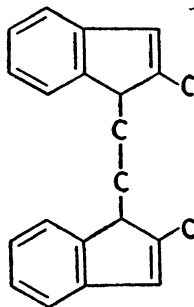


(2) Di-1-naphthylmethane

Diarylaliphatics, however, precede dialkyldiarylaliphatics. Thus 1,4-di-(1'-indenyl)-butane is listed before 1,2-di-[1'-(2'-methylindenyl)]-ethane.

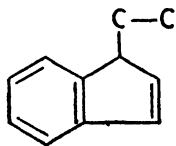


(1) 1,4-Di-(1'-indenyl)-butane

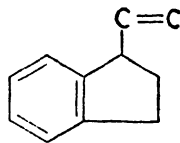


(2) 1,2-Di-[1'-(2'-methylindenyl)]-ethane

When two polynuclear nuclei have the same carbon structure, the least hydrogenated nucleus is tabulated first. As an illustration, 1-ethylindene precedes 1-ethenylindane.

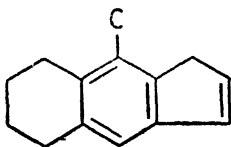
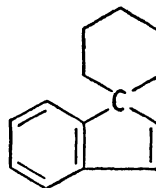


(1) 1-Ethylindene

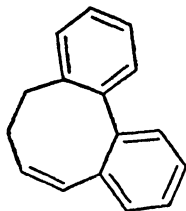


(2) 1-Ethenylindane

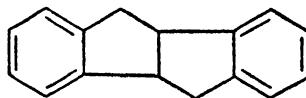
Spiro compounds follow others having rings of equivalent number and size. Both 7-methyl-5,6-cyclohexanoindene and spiro [indene-1,1'-cyclohexane] have fourteen carbon atoms and are named with reference to indene as the largest nucleus. They also have an equivalent number of rings of the same size. According to our arbitrary decision, the spiro compound is listed last.

(1) 7-Methyl-5,6-cyclohexanoindene
(1-5C and 2-6C rings)(2) Spiro [indene-1,1'-cyclohexane]
(1-5C and 2-6C rings)

In the assignment of positions in the present tabulation, *endo*- and *bicyclo*-structures are considered to be two rings. A dibenzocyclooctene, therefore, would precede a dibenzobicyclooctane because the latter has four rings (2-5C and 2-6C) while the former has only three rings (1-8C and 2-6C).

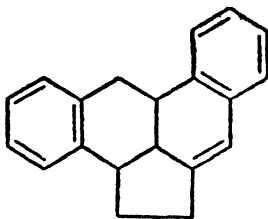


(1) 1,2,3,4-Dibenzocyclooctene-5

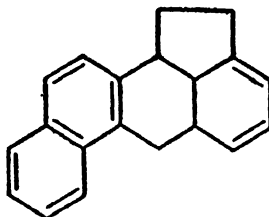


(2) 2,3,6,7-Dibenzobicyclo-[3,3,0]-octane

When two compounds have the same number of rings of the same size, but are not named as derivatives of the same nucleus, the compound having the name with the smallest parent nucleus is tabulated first. For example, benzo-[a]-cyclopentano-[de]-4a,9,9a,10-tetrahydroanthracene precedes 5a,6,12b,12c-tetrahydrocholanthrene.

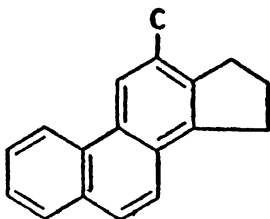


(1) Benzo-[a]-cyclopentano-[de]-4a,9,9a,10-tetrahydroanthracene

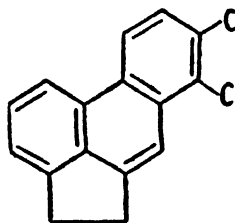


(2) 5a,6,12b,12c-Tetrahydrocholanthrene

When two compounds have nominally identical ring structures, but one compound has a larger ring structure because of the difference in position of a fused substituent, the compound having the least total substituents is recorded first. For example, 1,2-cyclopentano-3-methylphenanthrene precedes cyclopentano-[jk]-1,2-dimethylphenanthrene.



(1) 1,2 - Cyclopentano - 3 - methyl - phenanthrene



(2) Cyclopentano-[jk]-1,2-dimethylphenanthrene

A review of the Introduction to Volume III is suggested to clarify the order of tabulation of compounds when aliphatic and alicyclic substituents are involved.

I. BENZOCYCLANES, $C_n H_{2n-8}$

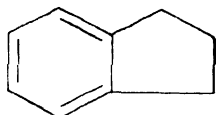
- 1. Indane and Its Alkyl Derivatives**
- 2. Tetrahydronaphthalene and Its Alkyl Derivatives**
- 3. Higher Benzocyclanes**

1. INDANE AND ITS ALKYL DERIVATIVES, C_nH_{2n-8}



Indane

(Hydrindene)



M. P., °C

-51.4¹²

B. P., °C @ 760mm

177

176-180⁴⁴

177.5-178.5¹³

177-178³⁰

175.5-177.5⁵³

177.0³³

177^{14, 27, 29}

176-177³⁴

176-176.5⁵²

176.25³³

176^{2, 47}

174-176^{19, 23}

177-181

771²⁸

177-178

764²⁵

176-176.5

762²²

174-174.5

751.5²⁶

176-176.5

742⁸

79.0

29¹²

51

14³⁸

66.5

13²¹

55

11⁴⁰

D_4^{20}

0.9639¹³

0.9645²

0.8942

100°¹³

0.9378

50°¹³

0.9560

25°⁴⁰

0.9599

25°⁴⁰

0.9507

$D_{25}^{25, 33, 34}$

0.9559

$D_{25}^{25, 34}$

0.9582

$D_{25}^{25, 33}$

0.9536

$D_{20}^{20, 33, 34}$

0.9601

$D_{20}^{20, 33}$

0.9611

$D_{20}^{20, 34}$

0.9547

19.5°⁵³

0.96250

16.4°³³

0.957

15°^{22, 52}

0.9570

$D_{15}^{15, 33, 34}$

0.960

$D_{15}^{15, 19}$

0.9645

$D_{15}^{15, 33, 34}$

0.95980

10.6°³³

0.9606

$D_{10}^{10, 34}$

0.9681

$D_{10}^{10, 33, 34}$

0.9646

$D_5^{5, 33}$

0.9723

$D_5^{5, 33}$

0.9656

$D_4^{4, 33}$

0.9732

$D_4^{4, 33}$

0.9813

0°¹³

n_D^{20}

1.5381²

1.5383¹³

1.5352

25°⁴⁰

1.5355

25°⁴⁰

1.5351₂

20.8°⁹

1.5382

20.7°¹²

1.53877

19.25°³⁴

1.5381

17.9°²¹

1.53877

16.4°³³

1.53896

15.95°³⁴

1.5407

15°¹³

1.5303₈

$n_{H\alpha}^{20.8, 9}$

1.53394

$n_{H\alpha}^{19.25, 34}$

1.53394

$n_{H\alpha}^{16.4, 33}$

1.53431

$n_{H\alpha}^{15.95, 34}$

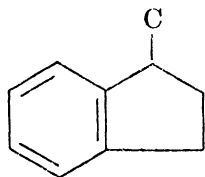
1.53431

$n_{H\alpha}^{10.6, 33}$

1.5471 ₃	$n_{H\beta}^{20.8 \ 9}$
1.55114	$n_{H\beta}^{19.25 \ 34}$
1.55114	$n_{H\beta}^{16.4 \ 33}$
1.55105	$n_{H\beta}^{15.95 \ 34}$
1.55105	$n_{H\beta}^{10.6 \ 33}$
1.56136	$n_{H\gamma}^{19.25 \ 34}$
1.56136	$n_{H\gamma}^{16.4 \ 33}$
1.56154	$n_{H\gamma}^{15.95 \ 34}$
1.56154	$n_{H\gamma}^{10.6 \ 33}$

(a)

(a) Refractive indices at other lines
are found in references 33, 34.

**1-Methylindane**

B. P., °C @ 760mm

186–187³¹182–183¹⁶182⁴⁷60–64 12⁴⁰60 10⁴⁰ D_4^{20} 0.940³⁷0.9402⁴⁰0.9407³¹

0.9383 25° 40

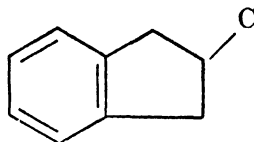
0.947 21° 40

0.9661 16° 46

 n_D^{20} 1.5222⁴⁰1.5260³⁷1.52742³¹

1.5204 25° 40

1.53938 16° 46

2-Methylindane

B. P., °C @ 760mm

183–185 747²⁰70 10⁴⁰69 10^{37, 40} D_4^{20} 0.932³⁷

0.9317 25° 40

0.9318 23° 40

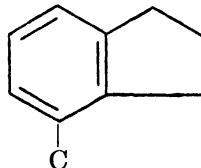
0.9321 22° 40

0.9034 $D_0^{17 \ 20}$ n_D^{20} 1.5235³⁷

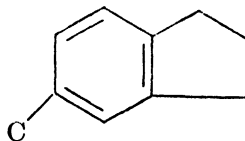
1.5189 25° 40

1.5200 23° 40

1.5224 22° 40

4-Methylindane

B. P., °C @ 760mm

203²⁴ D_4^{20} 0.9350²⁴**5-Methylindane**

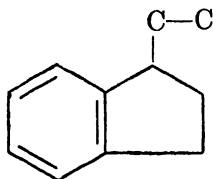
B. P., °C @ 760mm

74

11³⁵

D_4^{20} 0.9494³⁵ n_D^{20} 1.5332³⁵C₁₁H₁₄

1-Ethylindane



B. P., °C @ 760mm

212³⁹

84

12⁴⁰ D_4^{20}

0.9348

25°³⁹

0.9346

23°⁴⁰ n_D^{20}

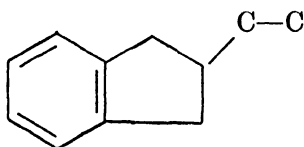
1.5202

23°⁴⁰

1.52286

 n_{He}^{25} 39

2-Ethylindane



B. P., °C @ 760mm

86

12⁴⁰ D_4^{20}

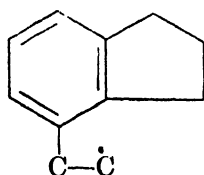
0.9266

24°⁴⁰ n_D^{20}

1.5160

24°⁴⁰

4-Ethylindane



B. P., °C @ 760mm

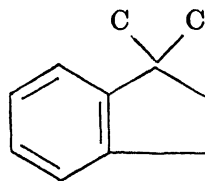
125-130

43⁵

71-72

2.5⁵

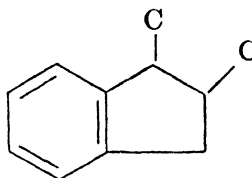
1,1-Dimethylindane



B. P., °C @ 760mm

191¹

1,2-Dimethylindane

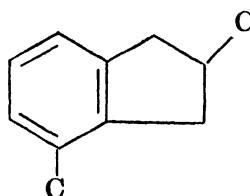


B. P., °C @ 760mm

79.80

10³⁷ D_4^{20} 0.927³⁷ n_D^{20} 1.5186³⁷

2,4-Dimethylindane



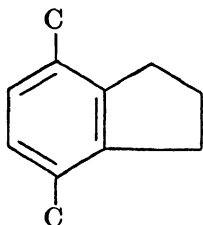
B. P., °C @ 760mm

105-106

25⁴

100-105

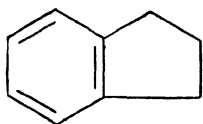
23⁵

4,7-Dimethylindane

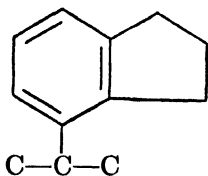
B. P., °C @ 760mm

94-97 10³⁷94 10³⁸ D_4^{20} 0.949³⁷ n_D^{20} 1.5342³⁷1.5346³⁸C₁₂H₁₆**1-Isopropylindane**

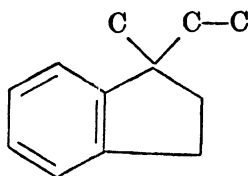
C—C—C



B. P., °C @ 760mm

98-100 17¹⁰**4-Isopropylindane**

B. P., °C @ 760mm

88-90 1^{3, 6}**1-Methyl-1-ethylindane**

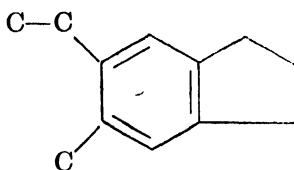
B. P., °C @ 760mm

218³⁹ D_4^{20}

0.9232

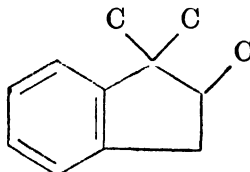
25°³⁹ n_D^{20}

1.51563

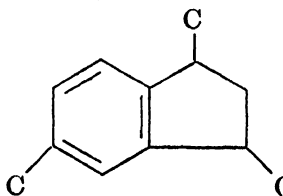
 n_{D6}^{25} ³⁹**5-Methyl-6-ethylindane**

B. P., °C @ 760mm

112-116

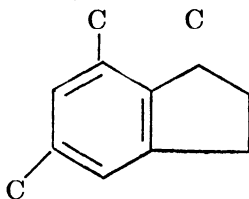
11^A**1,1,2-Trimethylindane**

B. P., °C @ 760mm

208^{1, 11} D_4^{20} 0.919¹¹ n_D^{20} 1.5137¹¹**1,3,5-Trimethylindane**

B. P., °C @ 760mm

98-99

14⁵¹ n_D^{20} 1.5206⁵¹**1,5,7-Trimethylindane**

B. P., °C @ 760mm

104-105

14⁵⁰ n_D^{20}

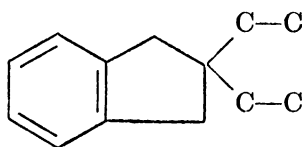
1.5231

25°⁵⁰**x-Butylindane (a)**

B. P., °C @ 760mm

238³²

(a) The structure of this compound was not clearly defined in the literature.

2,2-Diethylindane

B. P., °C @ 760mm

118

16¹⁷ D_4^{20} 0.9162¹⁷

0.9295

13.4°⁴⁵ n_D^{20}

1.5135

25°¹⁷

1.51406

 $n_{H\alpha}^{13.4\ 45}$

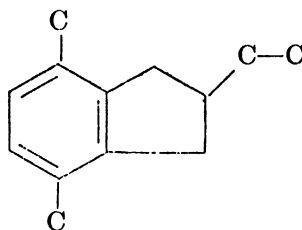
1.52792

 $n_{H\beta}^{13.4\ 45}$

1.53643

 $n_{H\gamma}^{13.4\ 45}$

1.51820

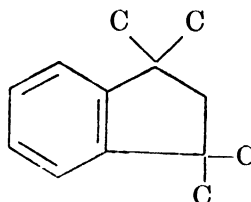
 $n_{H\delta}^{13.4\ 45}$ **2-Ethyl-4,7-dimethylindane**

B. P., °C @ 760mm

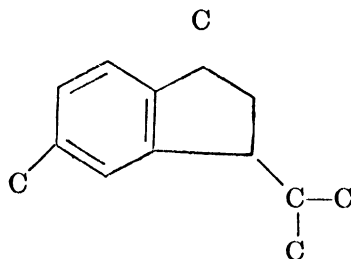
84-85

0.1⁴⁹ n_D^{20}

1.5207

22°⁴⁹**1,1,3,3-Tetramethylindane**

B. P., °C @ 760mm

206-209¹**1,5-Dimethyl-3-isopropylindane**

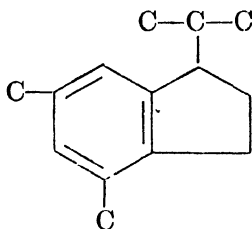
B. P., °C @ 760mm

115-16

10⁵¹ n_D^{20}

1.5179

21°⁵¹

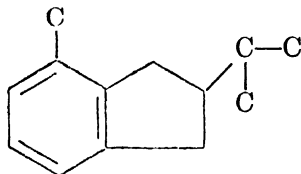
1-Isopropyl-4,6-dimethylindane

B. P., °C @ 760mm

118-120

0.3⁴⁸ n_D^{20}

1.5215

22.5°⁴⁸**2-Isopropyl-4,7-dimethylindane**

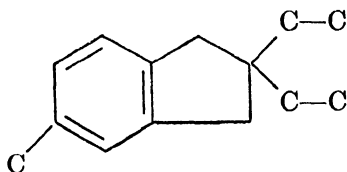
C

M. P., °C

23-24⁴¹

R. P., °C @ 760mm

108-110

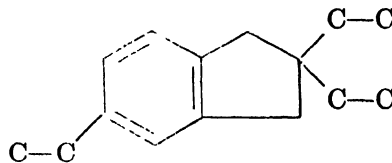
3⁴¹ n_D^{20} 1.518⁴¹**2,2-Diethyl-5-methylindane**

B. P., °C @ 760mm

123-127

12¹⁵ D_4^{20}

0.9197

21.5°¹⁵ n_D^{20} 1.51055¹⁵ $C_{15}H_{22}$ **2,2,5-Triethylindane** D_4^{20}

0.9178

16.2°⁴⁵

0.9250

14.05°⁴⁵ n_D^{20}

1.51081

 $n_{H\alpha}^{16.2\ 45}$

1.51323

 $n_{H\alpha}^{14.05\ 45}$

1.52426

 $n_{H\beta}^{16.2\ 45}$

1.52679

 $n_{H\beta}^{14.05\ 45}$

1.53242

 $n_{H\gamma}^{16.2\ 45}$

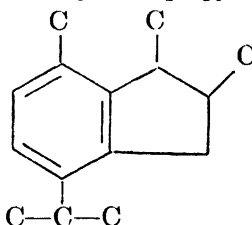
1.53522

 $n_{H\gamma}^{14.05\ 45}$

1.51473

 $n_{He}^{16.2\ 45}$

1.51741

 $n_{He}^{14.05\ 45}$ **1,2,7-Trimethyl-4-isopropylindane**

B. P., °C @ 760mm

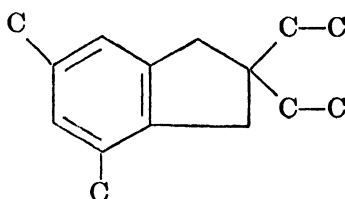
154-155

29⁷ D_4^{20}

0.9250

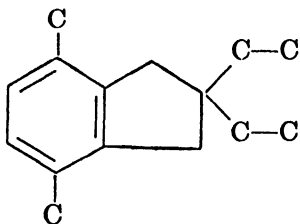
 $D_{25}^{25\ 7}$ n_D^{20}

1.5112

25°⁷**2,2-Diethyl-4,6-dimethylindane**

B. P., °C @ 760mm
265–270¹⁸
260–265¹⁸

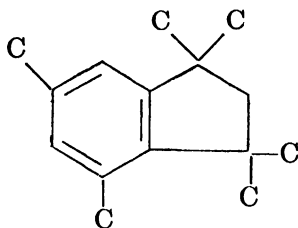
2,2-Diethyl-4,7-dimethylindane



B. P., °C @ 760mm
140–141 13¹⁶

D_4^{20} 0.923¹⁶
 n_D^{20} 1.51592¹⁶

1,1,3,3,4,6-Hexamethylindane

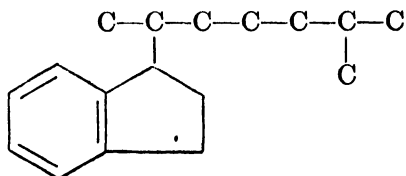


B. P., °C @ 760mm
114–117 13⁴³

D_4^{20} 0.901 31° 43
 0.905 D_{31}^{31} 43
 n_D^{20} 1.5100 28.5° 43

C₁₇H₂₆

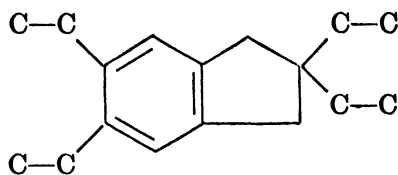
2-Methyl-6-indanylheptane



B. P., °C @ 760mm
100–102 0.2⁴⁰

D_4^{20} 0.9083 19° 40
 n_D^{20} 1.5065 19° 40

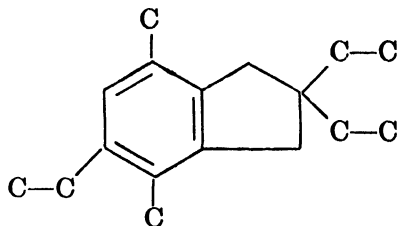
2,2,5,6-Tetraethylindane



D_4^{20} 0.9246 14.35° 45
 n_D^{20} 1.51582 $n_{H\alpha}^{14.35}$ 45

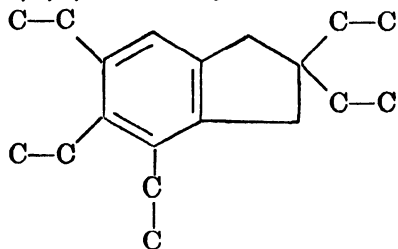
1.52935 $n_{H\beta}^{14.35}$ 45
1.53776 $n_{H\gamma}^{14.35}$ 45
1.51998 $n_{He}^{14.35}$ 45

2,2,5-Triethyl-4,7-dimethylindane

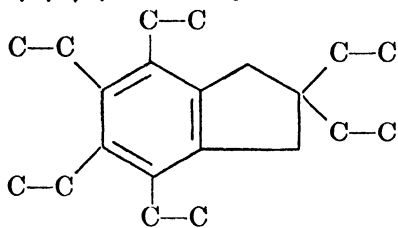


B. P., °C @ 760mm
163–164 14¹⁷

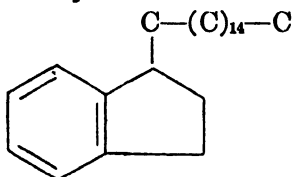
D_4^{20} 0.916¹⁷
 n_D^{20} 1.51592¹⁷

**2,2,4,5,6-Pentaethylindane**

D_4^{20}	0.9234	14.1° ⁴⁵
n_D^{20}	1.51702	$n_{H\alpha}^{14.1\ 45}$
	1.53043	$n_{H\beta}^{14.1\ 45}$
	1.53878	$n_{H\gamma}^{14.1\ 45}$
	1.52115	$n_{He}^{14.1\ 45}$

**2,2,4,5,6,7-Hexaethylindane**

D_4^{20}	0.9263	14.3° ⁴⁵
n_D^{20}	1.51856	$n_{H\alpha}^{14.3\ 45}$
	1.53198	$n_{H\beta}^{14.3\ 45}$
	1.54022	$n_{H\gamma}^{14.3\ 45}$
	1.52265	$n_{He}^{14.3\ 45}$

**1-n-Hexadecylindane**

M. P., °C

33.1⁴²

B. P., °C @ 760mm

206.5

1.00⁴²

191.5

0.50⁴² D_4^{20}

0.8333

98.9°⁴²

0.8587

60°⁴²

0.8738

37.8°⁴² n_D^{20} 1.4941⁴²

1.4863

40.0°⁴²

1.4902

30.0°⁴²*References on Indane and Its Alkyl Derivatives*

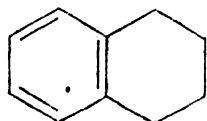
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2. TETRAHYDRONAPHTHALENE AND ITS ALKYL DERIVATIVES, C_nH_{2n-8}



1,2,3,4-Tetrahydronaphthalene (Tetralin)



M. P., °C

—35.8

—30—27⁶⁰

—30^{51, 52}

—31³³

—35.0 ± 0.5²³

—36.22(a) ³⁸		103.0	30 ²³
—36.3 ^{12, 13}		100–101	25 ⁶⁰
B. P., °C @ 760mm		101.1	22.8 ¹⁹
207.4		96	21 ⁶⁴
208 ^{25, 33, 51, 73}		93.8	20 ²³
206–208 ⁶⁰		90.8–91.2	17 ^{65, 70}
205–208 ^{6, 52, 57}		89	12 ²⁶
207.66 ³⁸		75.5	7.2 ¹⁹
207.6 ⁵⁴		75.1	7.1 ¹⁹
207.3 ²³		74.4	7.0 ¹⁹
207.1 ²³		71–72	6 ⁴¹
207.0 ¹²		54.0	2.2 ¹⁹
207 ^{14, 79}		52–55	2 ⁴⁶
206.6–207.0 ¹⁸		49.4	1.9 ¹⁹
206.5–207.0 ⁸²		48.9	1.9 ¹⁹
206.5–207 ³⁷		46.6	1.7 ¹⁹
206–207 ⁴⁷		65.0	0.83 ³⁵
205–207 (b)		41.8	0.7 ¹⁹
206 ^{10, 21, 34, 48, 61, 83}		40.8	0.7 ¹⁹
201–206 ³⁰		40.1	0.6 ¹⁹
205.4–205.8 ³²		39.3	0.5 ¹⁹
205.7 ⁶²		25.0	0.40 ³⁵
205 (c)		20	0.263 ⁵⁰
204–205 ^{9, 44, 49, 81}		20	0.26 ⁵⁰
207.6	768.66 ²³	—1.2	0.0235 ³⁵
206–207	764 ⁷⁰	—2.4	0.015 ³⁵
207	763 ⁷⁷		
206.8 ± 0.2	759 ⁷	<i>D</i> ₄ ²⁰	
206.5	755 ⁶⁰	0.9702	
206.6	751.28 ²³	0.966 ^{34, 83}	
206.2	740 ²³	0.9663 ⁷⁷	
204–205	722 ⁴	0.9681 ⁴⁵	
204.0–204.5	716.3 ⁸²	0.9705 ³⁸	
204.5–205	716 ³	0.9706 ⁶⁵	
205–207	708 ²	0.9707 ¹⁸	
167.5	273 ²³	0.971 ^{66, 67, 71}	
150.0	162 ²³	0.9712 ⁸²	
148.6	147.2 ¹⁹	0.9714 ⁷⁷	
140.0	118 ²³	0.972 ^{47, 63}	
126.9	76.0 ²³	0.973 ^{22, 31}	
126.6	67.8 ¹⁹	0.8496	179.6° ²³
116.8	52.5 ²³	0.851	170° ²²
105.2	36 ⁷⁵	0.8718	150.0° ²³
		0.892	120° ²²
		0.9072	100° ¹⁸

0.9210	84.0° ²³	n_D^{20}	1.5397 ⁷⁷	
0.924	80° ²²		1.5402 ^{34, 40, 83}	
0.9257	78.45° ²³		1.54161 ³⁸	
0.9272	75° ²³		1.5427 ⁷⁶	
0.9396	60° ²³		1.54282 ⁸²	
0.943	50° ¹⁵		1.5429 ⁶⁵	
0.9464	50° ²³		1.5430 ⁴⁷	
0.9469	50° ¹⁸		1.5434 ⁷¹	
0.949	50° ²²		1.5437 ⁶⁷	
0.9567	36.7° ²³		1.5438 ¹⁸	
0.9638	27° ²⁷		1.5439 ¹⁹	
0.9652	25° ²³		1.5441 ⁷⁷	
0.9659	25° ⁵		1.5442 ⁷¹	
0.9665	25° ³⁸		1.54493 ¹⁶	
0.9666	25° ⁴¹		1.546 ³¹	
0.9675	25° ^{28, 30}		1.54638 ¹⁶	
0.9678	25° ²⁸		1.54678 ¹⁶	
0.9658	24.7° ²³			170° ²²
0.965	21.5° ¹⁶		1.487	120° ²²
0.9694	21.4° ⁷⁰		1.507	80° ²²
0.9729	20.2° ³¹		1.524	50° ²²
0.9735	$D_{20}^{20, 24}$		1.537	25° ²⁸
0.975	$D_{20}^{20, 36}$		1.5392	25° ³⁸
0.9732	18.0° ⁷⁰		1.53952	25° ²⁸
0.9734	17.8° ⁷⁰		1.5396	25° ³⁰
0.9738	17.6° ⁷⁰		1.5408	25° ⁴¹
0.9718	17° ⁷⁴		1.5410	21.4° ⁷⁰
0.9737	17° ⁸		1.54222	20.6° ³¹
0.9731	15.1° ²³		1.54605	20.2° ³¹
0.9698	15° ¹⁵		1.54614	19.9° ²⁴
0.972	15° ⁵⁷		1.5443	17.8° ⁷⁰
0.974	15° ⁷⁸		1.54511	17.6° ⁷⁰
0.975	15° ^{43, 58, 59, 69}		1.54529	17° ⁸
0.977	15° ⁵³		1.5468	15° ¹⁸
0.9774	15° ⁶⁸		1.5465	15° ⁶⁸
0.9743	13.5° ²³		1.5481	13.35° ⁴⁹
0.97572	13.35° ⁴⁹		1.55200	11.9° ⁴⁹
0.9745	13.3° ²³		1.55312	78.1 ¹⁷
0.97634	11.9° ⁴⁹		1.51140	$n_{H\alpha}^{25, 38}$
0.9842	2° ²³		1.53496	$n_{H\alpha}^{21.4, 70}$
0.9825	0° ⁵⁶		1.53765	$n_{H\alpha}^{20.6, 81}$
0.984	0° ³⁴		1.54612	$n_{H\alpha}^{20.2, 81}$
0.9866	0° ¹⁸		1.54181	
0.984	$D_0^{0, 83}$			

1.53703	$n_{H\alpha}^{20.88}$
1.54021	$n_{H\alpha}^{17.870}$
1.54057	$n_{H\alpha}^{17.670}$
1.54703	$n_{H\alpha}^{13.3549}$
1.54819	$n_{H\alpha}^{11.949}$
1.52700	$n_{H\beta}^{78.117}$
1.55097	$n_{H\beta}^{26.88}$
1.55405	$n_{H\beta}^{21.470}$
1.55853	$n_{H\beta}^{20.631}$
1.55869	$n_{H\beta}^{20.231}$
1.55326	$n_{H\beta}^{20.38}$
1.55709	$n_{H\beta}^{17.870}$
1.55734	$n_{H\beta}^{17.670}$
1.56533	$n_{H\beta}^{13.3549}$
1.56656	$n_{H\beta}^{11.949}$
1.53685	$n_{H\gamma}^{78.117}$
1.56424	$n_{H\gamma}^{21.470}$
1.56907	$n_{H\gamma}^{20.631}$
1.56914	$n_{H\gamma}^{20.231}$
1.56765	$n_{H\gamma}^{17.870}$
1.56782	$n_{H\gamma}^{17.670}$
1.57838	$n_{H\gamma}^{11.949}$

Additional Data

$$\frac{dD}{dt} = -0.0007761$$

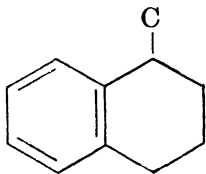
(0 to 50°C)

- This constant was given as a freezing point in the literature.
- The boiling point 205–207 is found in references 1, 29, 43, 50, 58, 59, 66, 68, 69, 76, 80.
- The boiling point 205 is found in references 11, 20, 39, 40, 42, 53, 56, 72.

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**1-Methyl-1,2,3,4-tetrahydronaphthalene**

B. P., °C @ 760mm

218–219⁴⁴

153–155

55¹ D_4^{20}

0.9536

25°⁴⁴

0.9546

25°⁴⁴

0.9547

25°⁴⁴ n_D^{20}

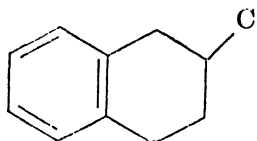
1.53316

 $n_{He}^{25\ 44}$

1.53332

 $n_{He}^{25\ 44}$

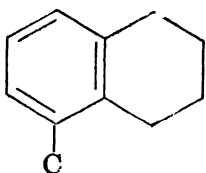
1.53366

 $n_{He}^{25\ 44}$ **2-Methyl-1,2,3,4-tetrahydronaphthalene**

B. P., °C @ 760mm

220–222⁴⁷221³220³³218–220³²

99–101

13³**5-Methyl-1,2,3,4-tetrahydronaphthalene**

M. P., °C

–23.02 (a)³⁴

B. P., °C @ 760mm

234.4⁴⁵234.35³⁴

184.98

217.2³⁴

143.76

57.3³⁴ D_4^{20} 0.9720³⁴

0.9682

25°³⁴ n_D^{20} 1.54395³⁴

1.54190

25°³⁴

1.53738

 $n_{H\alpha}^{25\ 34}$

1.53937

 $n_{H\alpha}^{20\ 34}$

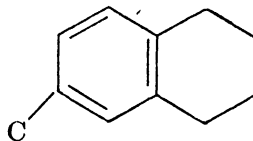
1.55325

 $n_{H\beta}^{25\ 34}$

1.55536

 $n_{H\beta}^{20\ 34}$

(a) This constant was given as a freezing point in the literature

6-Methyl-1,2,3,4-tetrahydronaphthalene

M. P., °C

–39.92 (a)³⁴

B. P., °C @ 760mm

229.03³⁴229.0⁴⁵224–226²⁷

179.91

217.2³⁴

138.75

57.3³⁴ D_4^{20} 0.950²⁷0.9537³⁴

0.9500

25°³⁴

0.9541

15.1°²⁷ n_D^{20} 1.5328²¹

1.535 ²⁷	
1.53572 ³⁴	
1.53365	25° ³⁴
1.53719	15.1° ²⁷
1.52920	$n_{H\alpha}^{25\ 34}$
1.53115	$n_{H\alpha}^{20\ 34}$
1.53316	$n_{H\alpha}^{15.1\ 27}$
1.54498	$n_{H\beta}^{25\ 34}$
1.54706	$n_{H\beta}^{20\ 34}$
1.54907	$n_{H\beta}^{15.1\ 27}$
1.55897	$n_{H\gamma}^{15.1\ 27}$

(a) This constant was given as a freezing point in the literature.

x-Methyl-1,2,3,4-tetrahydronaphthalene (a)

B. P., °C @ 760mm

115–117 15°

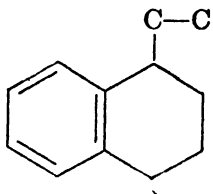
D_4^{20}

0.9368⁴³

(a) The structure of this compound was not clearly defined in the literature.



1-Ethyl-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm

237–238⁴⁴

241.5–243.5 739³⁹

D_4^{20}

0.9529³⁹

0.9498 25°⁴⁴

0.9511 25°⁴⁴

n_D^{20}

1.5388³⁹

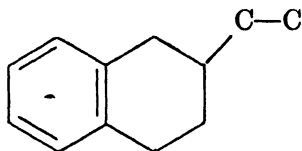
1.52992

1.52999

$n_{He}^{25\ 44}$

$n_{He}^{25\ 44}$

2-Ethyl-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm

237³¹

235–235.5

731³⁰

63–65

0.5³⁸

D_4^{20}

0.9401

15.5°³⁰

0.9447

15°³¹

0.9515

D_0^0 ³⁰

0.9542

D_0^0 ³¹

n_D^{20}

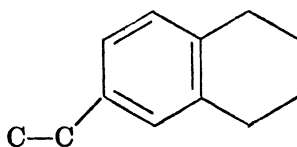
1.5250

15.5°³⁰

1.5287

15°³¹

6-Ethyl-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm

245–246²⁷

239–239.5

736³⁰

127

21²²

D_4^{20}

0.948²⁷

0.9499

17.6°²⁷

0.9608

15.5°³⁰

0.9733

D_0^0 ³⁰

n_D^{20}

1.534²⁷

1.53474

17.6°²⁷

1.5350	$15.5^{\circ} 30$
1.53072	$n_{H\alpha}^{17.6 \ 27}$
1.54627	$n_{H\beta}^{17.6 \ 27}$
1.55594	$n_{H\gamma}^{17.6 \ 27}$

x-Ethyl-1,2,3,4-tetrahydronaphthalene (a)

B. P., °C @ 760mm

244⁵

119–120 12⁵

121–122 10³

D_4^{20}

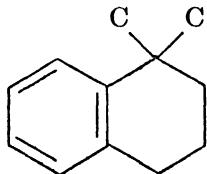
0.9632 17° 5

n_D^{20}

1.5414 16° 5

(a) The ethyl group may be in either the 2- or 6-position.

1,1-Dimethyl-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm

220–222 761⁸

98 10⁸

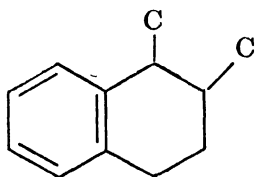
D_4^{20}

0.9474 25° 8

n_D^{20}

1.52736 25° 8

1,2-Dimethyl-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm

235⁴⁴

123.5–124.5 11⁵⁰

D_4^{20}

0.988⁵⁰

0.9433 25° 44

0.9844 23.8° 50

0.9847 23.5° 50

n_D^{20}

1.5593⁵⁰

1.55762 23.8° 50

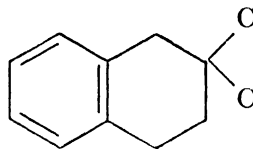
1.55298 $n_{H\alpha}^{23.8 \ 50}$

1.57082 $n_{H\beta}^{23.8 \ 50}$

1.58195 $n_{H\gamma}^{23.8 \ 50}$

1.52652 $n_{He}^{25 \ 44}$

2,2-Dimethyl-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm

123 34⁴⁸

104 12¹⁵

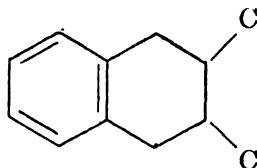
D_4^{20}

0.92483 24.1° 48

n_D^{20}

1.51850 24.1° 48

2,3-Dimethyl-1,2,3,4-tetrahydronaphthalene



M. P., °C

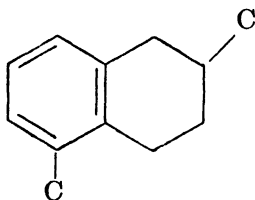
4–8 (a)¹⁷

–8––5 (a)¹⁷

B. P., °C @ 760mm

229–231 (a)¹⁷227^{32, 33}222–224 (a)¹⁷

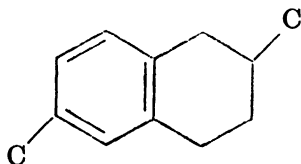
(a) These constants were determined on isomeric forms.

2,5-Dimethyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm

115 14²⁶110–111 10³⁵ D_4^{20}

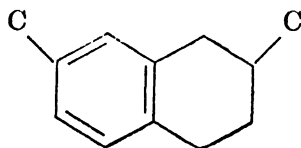
0.9487 16° 35

2,6-Dimethyl-1,2,3,4-tetrahydronaphthalene

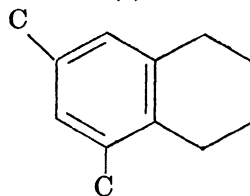
M. P., °C

14–17¹⁶

B. P., °C @ 760mm

237–239¹⁶**2,7-Dimethyl-1,2,3,4-tetrahydronaphthalene**

B. P., °C @ 760mm

237–238¹⁶**5,7-Dimethyl-1,2,3,4-tetrahydronaphthalene (a)**

B. P., °C @ 760mm

250–252²⁷ D_4^{20} 0.960²⁷

0.9589

21.0° 27

 n_D^{20} 1.541²⁷

1.54094

21.0° 27

1.53683

 $n_{II\alpha}^{21.0\ 27}$

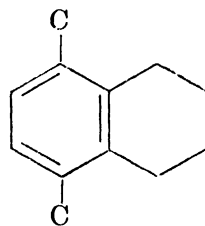
1.55287

 $n_{II\beta}^{21.0\ 27}$

1.56297

 $n_{II\gamma}^{21.0\ 27}$

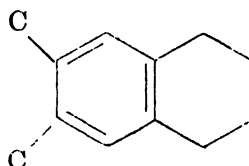
(a) The structure of this compound was not clearly defined in the literature.

5,8-Dimethyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm

254⁴

120

1⁴**6,7-Dimethyl-1,2,3,4-tetrahydronaphthalene**

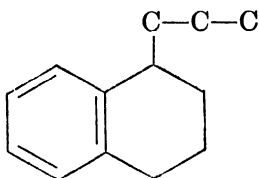
M. P., °C

10¹⁷

B. P., °C @ 760mm

244-246¹⁷

128

7⁴C₁₃H₁₈**1-*n*-Propyl-1,2,3,4-tetrahydronaphthalene**

B. P., °C @ 760mm

253⁴⁴

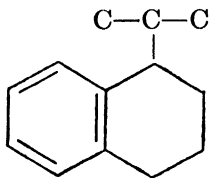
256-258

759³⁹ D_4^{20} 0.9395³⁹

0.9415

25° ⁴⁴ n_D^{20} 1.5308³⁹

1.52496

 $n_{Ho}^{25 \ 44}$ **1-Isopropyl-1,2,3,4-tetrahydronaphthalene**

B. P., °C @ 760mm

247⁴⁴ D_4^{20}

0.9450

25° ⁴⁴ n_D^{20}

1.52705

 $n_{Ho}^{25 \ 44}$ **1-Isopropyl-1,2,3,4-tetrahydronaphthalene (a)**

B. P., °C @ 760mm

124-126

13³

127

7⁵ D_4^{20}

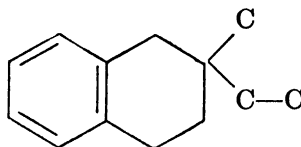
0.9518

16° ⁵ n_D^{20}

1.5352

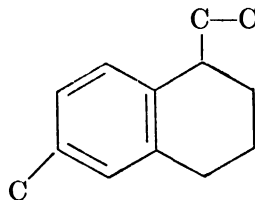
16° ⁵

(a) The isopropyl group may be in either the 2- or 6-position.

2-Methyl-2-ethyl-1,2,3,4-tetrahydronaphthalene

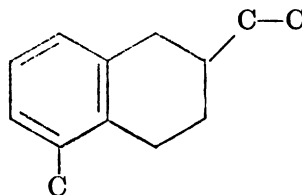
B. P., °C @ 760mm

118

20¹⁵**1-Ethyl-6-methyl-1,2,3,4-tetrahydronaphthalene**

B. P., °C @ 760mm

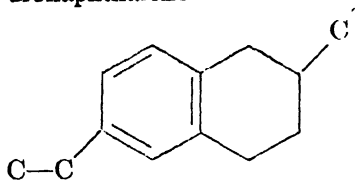
126

10¹¹**2-Ethyl-5-methyl-1,2,3,4-tetrahydronaphthalene**

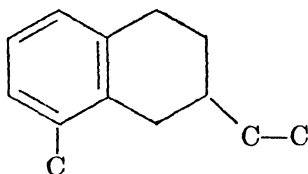
B. P., °C @ 760mm .

130

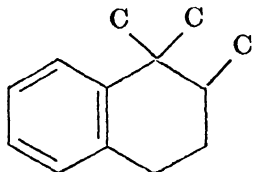
16²³

2-Methyl-6-ethyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm
140-145 10¹²

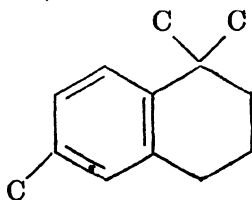
3-Ethyl-5-methyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm
129-131 14²³

1,1,2-Trimethyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm
241-242 760.7⁴²

n_D^{20}
1.5270 25°⁴²

1,1,6-Trimethyl-1,2,3,4-tetrahydronaphthalene (Ionene)

B. P., °C @ 760mm

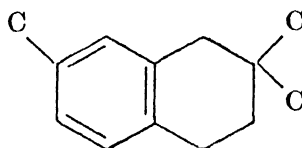
240-242 752⁹
238-239 730³⁷
130 30¹⁴
114 14⁹
107 10⁹
88-91 4⁸

D_4^{20}

0.9303⁹
0.9331⁹
0.9356³⁷
0.9320 25°⁸

n_D^{20}

1.5225⁹
1.5257³⁷
1.52167 25°⁸

2,2,7-Trimethyl-1,2,3,4-tetrahydronaphthalene

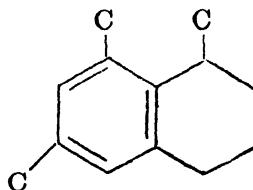
B. P., °C @ 760mm
128 23⁴⁸

D_4^{20}

0.91747 24.5°⁴⁸

n_D^{20}

1.51635 24.5°⁴⁸

1,6,8-Trimethyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm
133-136 18.5²⁴

C₁₄H₂₀**x-n-Butyl-1,2,3,4-tetrahydronaphthalene (a)**

B. P., °C @ 760mm

272-273 750³⁹269-270 750³⁹ D_4^{20} 0.9312³⁹0.9331³⁹ n_D^{20} 1.5258³⁹1.5271³⁹

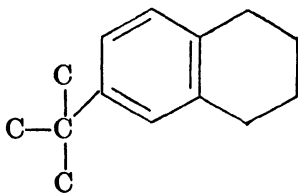
(a) The structure of this compound was not clearly defined in the literature.

x-sec-Butyl-1,2,3,4-tetrahydronaphthalene (a)

B. P., °C @ 760mm

268-270 759³⁹ D_4^{20} 0.9356³⁹ n_D^{20} 1.5255³⁹

(a) The structure of this compound was not clearly defined in the literature.

6-tert-Butyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm

262-264 752¹⁰138-140 18¹⁰135-136 16¹⁰**x-tert-Butyl-1,2,3,4-tetrahydronaphthalene (a)**

B. P., °C @ 760mm

265-267 746³⁹129 11³ D_4^{20} 0.9349³⁹ n_D^{20} 1.5292³⁹

(a) The structure of this compound was not clearly defined in the literature.

x-Butyl-1,2,3,4-tetrahydronaphthalene (a)

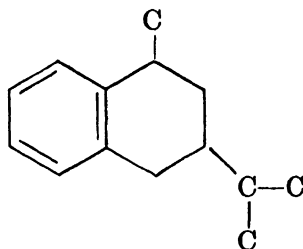
B. P., °C @ 760mm

265.5-266.5⁵ 9⁶

138

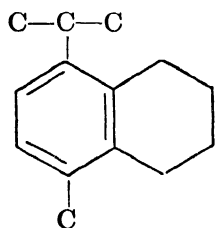
 D_4^{20} 0.9463 15°⁵ n_D^{20} 1.5348 15°⁵

(a) The butyl group may be in either the 2- or 6-position.

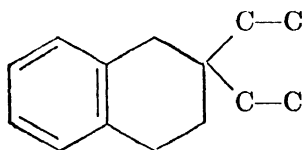
1-Methyl-3-isopropyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm

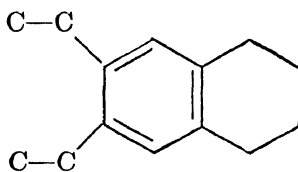
138-139 16¹⁸

5-Methyl-8-isopropyl-1,2,3,4-tetrahydronaphthalene

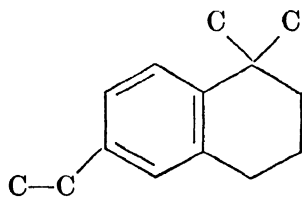
B. P., °C @ 760mm
135–140 12⁴⁶

2,2-Diethyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm
110 4⁴⁸

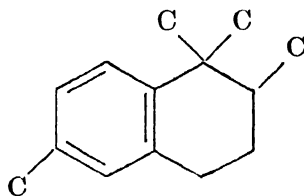
6,7-Diethyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm
150–151 18²²

1,1-Dimethyl-6-ethyl-1,2,3,4-tetrahydronaphthalene

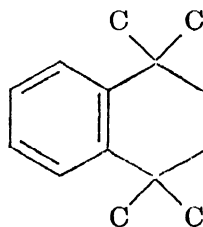
B. P., °C @ 760mm
104–105 4⁴¹

D_4^{20}	0.9304	25° ⁴¹
n_D^{20}	1.5220	25° ⁴¹

1,1,2,6-Tetramethyl-1,2,3,4-tetrahydronaphthalene (Irene)

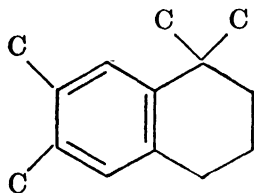
B. P., °C @ 760mm
120–125 10^{6,7}

D_4^{20}	0.9379	25° ⁶
n_D^{20}	1.5117	25° ⁶
	1.5261	25° ⁶

1,1,4,4-Tetramethyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm
248¹³
82–84 3¹³

D_4^{20}	0.9482	27° ¹³
n_D^{20}	1.5278	27° ¹³

1,1,6,7-Tetramethyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm	103-104	4 ⁴¹
D_4^{20}	0.9392	25° 41
n_D^{20}	1.5280	25° 41

 $C_{15}H_{22}$ **x-Pentyl-1,2,3,4-tetrahydronaphthalene (a)**

B. P., °C @ 760mm	147-150	12 ⁵
D_4^{20}	0.9478	17° 5
n_D^{20}	1.5332	17° 5

(a) The pentyl group may be in either the 2- or 6-position.

 $C_{16}H_{24}$ **x-Hexyl-1,2,3,4-tetrahydronaphthalene (a)**

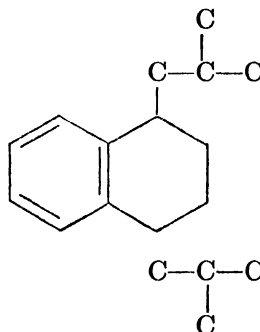
B. P., °C @ 760mm	120.5-122	0.8 ⁴⁰
D_4^{20}	0.9203 ⁴⁰	
n_D^{20}	1.5171 ⁴⁰	

(a) The structure of this compound was not clearly defined in the literature.

 $C_{18}H_{28}$ **x-n-Octyl-1,2,3,4-tetrahydronaphthalene (a)**

B. P., °C @ 760mm	324-326	740 ³⁹
D_4^{20}	0.9132 ³⁹	
n_D^{20}	1.5138 ³⁹	

(a) The structure of this compound was not clearly defined in the literature.

1,4-Diisobutyl-1,2,3,4-tetrahydronaphthalene

B. P., °C @ 760mm	170-175	16 ²⁵
D_4^{20}	0.8619	100° 19
	0.8939	50° 19
	0.9137	19° 25, 29
	0.9194	10° 25
	0.9259	0° 19
n_D^{20}	1.5184	18° 25, 29

 $C_{22}H_{36}$ **x,x-Dihexyl-1,2,3,4-tetrahydronaphthalene (a)**

M. P., °C	-36 ⁴⁰	
B. P., °C @ 760mm	182-184	1.5 ⁴⁰

D_4^{20} 0.9303⁴⁰

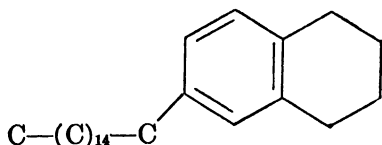
0.9358

 $D_{16}^{15\ 40}$ n_D^{20} 1.5220⁴⁰

(a) The structure of this compound was not clearly defined in the literature.

C₂₆H₄₄

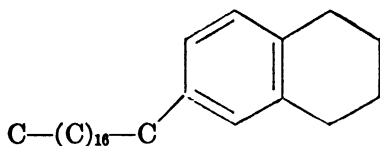
6-*n*-Hexadecyl-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm
210-215

1²⁰C₂₈H₄₈

6-*n*-Octadecyl-1,2,3,4-tetrahydronaphthalene



M. P., °C

32.5-33²⁸29-30³⁶ D_4^{20}

0.8656

55°²⁸

0.8722

45°²⁸ n_D^{20}

1.48656

55°²⁸

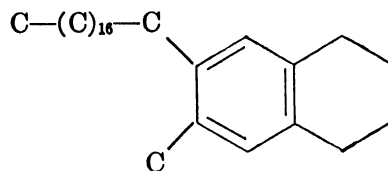
1.48280

 $n_{H\alpha}^{55\ 28}$

1.49371

 $n_{H\beta}^{55\ 28}$ C₂₉H₅₀

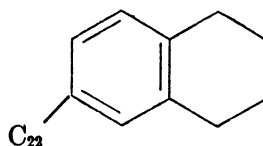
6-Methyl-7-*n*-octadecyl-1,2,3,4-tetrahydronaphthalene



M. P., °C

60-61²⁰C₃₂H₅₆

6-Docosyl-1,2,3,4-tetrahydronaphthalene



M. P., °C

43-45³⁶ D_4^{20}

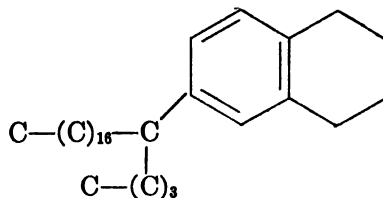
0.8786

25°³⁶ n_D^{20}

1.4969

25°³⁶

6-(5'-Docosyl)-1,2,3,4-tetrahydronaphthalene

 D_4^{20}

0.881

25°³⁶ n_D^{20}

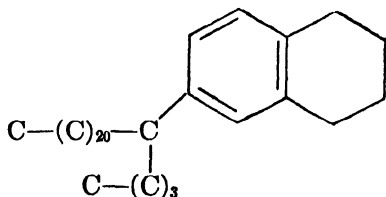
1.4723

80°⁴⁹

1.4932

25°^{36, 49}

$C_{86}H_{64}$
6-(5'-Hexacosyl)-1,2,3,4-tetrahy-
dronaphthalene



M. P., °C

35³⁶

D_4^{20}

0.8762

25° ³⁶

n_D^{20}

1.4940

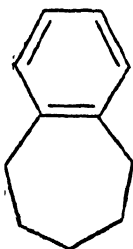
25° ³⁶

*References on $C_{11}H_{14}$ through $C_{86}H_{64}$
Compounds*

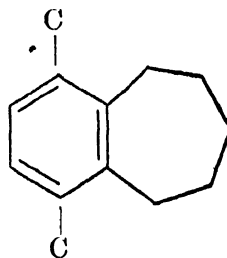
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4. Barnett, E. deB., and F. G. Sanders, *J. Chem. Soc.* **1933**, 434.
5. Boedtke, E., and O. Rambeck, *Bull. soc. chim.* [4] **35**, 631 **1924**.
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3. HIGHER BENZOCYCLANES, C_nH_{2n-8}Benzocycloheptane
(Benzosuberane)

B. P., °C @ 760mm

217 764^{1, 4} D_4^{20} 0.9693 19°⁴0.9683 16.2°² n_D^{20} 1.5458 19°⁴1.54364 $n_{H\alpha}^{16.2\ 2}$ 1.56040 $n_{H\beta}^{16.2\ 2}$ 1.57108 $n_{H\gamma}^{16.2\ 2}$ 1.54856 $n_{Ho}^{16.2\ 2}$ 2,3-Cycloheptano-1,4-dimethyl-
benzene

B. P., °C @ 760mm

122 13°

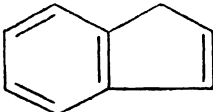
 D_4^{20} 0.9621 20.5°³ n_D^{20} 1.5344 20.5°³*References on Higher Benzocyclanes*

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II. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-10}

1. Indene and Its Alkyl Derivatives
2. Indane with One Alkenyl or One Alkylidene Substitution
3. Dihydronaphthalene and Its Alkyl Derivatives
4. Tetrahydronaphthalene Derivatives of Empirical Formula C_nH_{2n-10}
5. Cyclopentanotetrahydronaphthalenes and Their Alkyl Derivatives
6. Octahydroanthracenes and Their Alkyl Derivatives
7. Octahydrophenanthrenes and Their Alkyl Derivatives
8. Miscellaneous Polynuclear Aromatics of Empirical Formula C_nH_{2n-10}

1. INDENE AND ITS ALKYL DERIVATIVES, C_nH_{2n-10}

C_9H_8		55.0–55.5	6.5 ¹²
Indene		35–37	2 ⁵¹
		D_4^{20}	
M. P., °C		0.9915 ⁴⁰	
–1.50 (a) ³⁸		0.992 ⁴⁴	
–1.67 ⁸		0.9968 ⁹	
–1.76 ¹⁴		1.000 ¹	
–2 ^{39, 40}		0.9232	100° ⁹
B. P., °C @ 760mm		0.9692	50° ⁹
181		0.984	25° ⁶
181–183 ^{1, 11}		0.9906	$D_{25}^{25, 29, 30}$
182.4 ²⁰		1.0121	$D_{25}^{25, 29}$
181.8–182.3 ⁹		0.9925	$D_{20}^{20, 29}$
182.2 ³⁶		0.9934	$D_{20}^{20, 30}$
182 ^{23, 50}		1.006	$D_{20}^{20, 21}$
181–182 ⁵⁸		1.0152	$D_{20}^{20, 29, 30}$
181–181.5 ⁵²		0.9975	18° ⁴⁰
181.0 ²⁹		1.008	15° ⁵⁰
181 (b)		1.040	15° ¹⁷
179.5–180.5 ^{29, 30}		0.9970	$D_{15}^{15, 30}$
179.0–180.4 ²⁶		0.9971	$D_{15}^{15, 29}$
180.0 ²⁹		1.0002	$D_{15}^{15, 39}$
179.5–180 ⁵⁶		1.0187	$D_{15}^{15, 29, 30}$
179.5 ²⁸		1.01995	12.7° ²⁹
178.5–179.5 ³⁰		1.0001	12° ¹²
179 ^{27, 40}		1.0008	$D_{10}^{10, 29, 30}$
180.5–181	764 ³⁰	1.0225	$D_{10}^{10, 29, 30}$
182.2–182.4	761 ³⁹	1.00227	8.2° ²⁹
179.5–180.5	757 ¹⁷	1.0060	8° ⁴⁰
182.1–182.7	756.4 ⁶	1.0050	$D_5^{5, 29}$
181–181.3	749.6 ¹³	1.0268	$D_5^{5, 29}$
83.8	30.5 ⁸	1.0059	4° ^{29, 30}
76	25 ³¹	1.0081	4° ¹³
68	15 ⁴⁴	1.0277	4° ^{29, 30}
70.8	12 ¹⁶	1.0152	0° ⁹
62	10 ²⁵	n_D^{20}	
		1.5642 ¹	

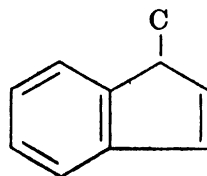
1.575 ⁴⁴	
1.5764 ³⁸	
1.5768 ⁹	
1.5755	25° 25
1.5743	22° 57
1.5769	22° 58
1.5767	19.8° 8
1.5770	19° 19
1.5773	18.5° 39
1.5763	17.6° 16
1.5738 ₇	16.1° 7
1.57980	15.3° 30
1.5790	15° 9
1.5804	10° 12
1.57980	8.2° 29
1.56940	$n_{H\alpha}^{20\ 40}$
1.5675 ₄	$n_{H\alpha}^{16.1\ 7}$
1.56454	$n_{H\alpha}^{15.6\ 30}$
1.57354	$n_{H\alpha}^{15.3\ 30}$
1.56454	$n_{H\alpha}^{12.7\ 29}$
1.57354	$n_{H\alpha}^{8.2\ 29}$
1.5903 ₉	$n_{H\beta}^{16.1\ 7}$
1.58743	$n_{H\beta}^{15.6\ 30}$
1.59693	$n_{H\beta}^{15.3\ 30}$
1.58743	$n_{H\beta}^{12.7\ 29}$
1.59693	$n_{H\beta}^{8.2\ 29}$
1.60220	$n_{H\gamma}^{15.6\ 30}$
1.61219	$n_{H\gamma}^{15.3\ 30}$
1.60220	$n_{H\gamma}^{12.7\ 29}$
1.61219	$n_{H\gamma}^{8.2\ 29}$

(c)

- (a) This constant was given as a freezing point in the literature.
- (b) The boiling point 181 is found in references 5, 10, 14, 19, 22, 29, 30, 57.
- (c) Refractive indices at other lines are found in references 29, 30.



1-Methylindene



B. P., °C @ 760mm

198–202⁴³197–200²⁴198.5⁵⁴

70

10³⁵ D_4^{20} 0.9640⁵⁴

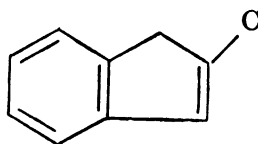
0.9708

25° 35

 n_D^{20} 1.5595

25° 35

2-Methylindene



B. P., °C @ 760mm

184–185

741⁴⁷

97–99

24¹⁵

96–97

24¹⁵

94–96

24¹⁵

62–65

20⁴⁷

79

10³⁵ D_4^{20} 0.9734

0.9897

19° 35

14° 47

 n_D^{20} 1.5645

1.5646

23° 15

23° 15

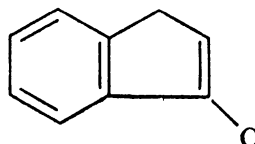
1.5650

19° 35

1.57574

14° 47

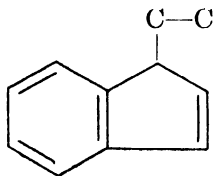
3-Methylindene



B. P., °C @ 760mm

205–206^{2, 3, 33, 34, 41}91–92 24¹⁵86 15⁴⁴81–83 14¹⁵77–81 14¹⁵81 13³² D_4^{20} 0.975⁴⁴0.9682 27°³ n_D^{20} 1.562⁴⁴1.5535 27°¹⁵1.5590 27°¹⁵1.55907 27°³1.5598 23°¹⁵1.55319 $n_{H\alpha}^{27\ 3}$ 1.57460 $n_{H\beta}^{27\ 3}$ 1.58865 $n_{H\gamma}^{27\ 3}$ C₁₁H₁₂

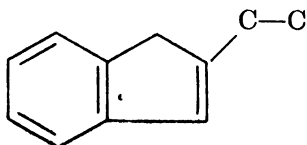
1-Ethylindene



B. P., °C @ 760mm

226⁴⁵215–216⁵⁴116 18⁵⁴92 12³⁵ D_4^{20} 0.9645 22°³⁵0.9732 22°⁴⁵ n_D^{20} 1.5543 22°³⁵

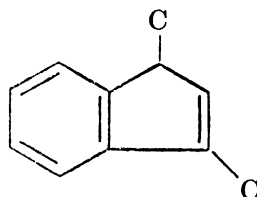
2-Ethylindene



B. P., °C @ 760mm

96 11³⁵ D_4^{20} 0.9619 22°³⁵ n_D^{20} 1.5525 22°³⁵

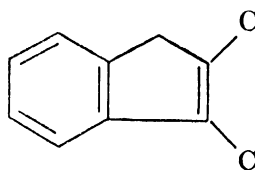
1,3-Dimethylindene



B. P., °C @ 760mm

212–214⁴⁶86–88 11⁴⁶ D_4^{20} 0.9553⁴⁶ n_D^{20} 1.53444⁴⁶

2,3-Dimethylindene



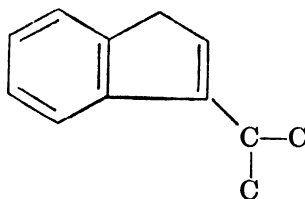
M. P., °C

11⁴¹

B. P., °C @ 760mm

111.5–112.5 19⁴¹C₁₂H₁₄

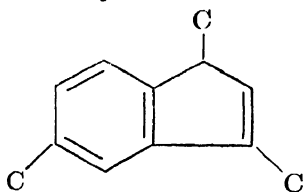
3-Isopropylindene



B. P., °C @ 760mm

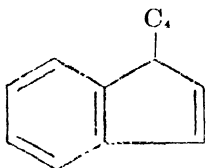
113

15⁴²

1,3,5-Trimethylindene

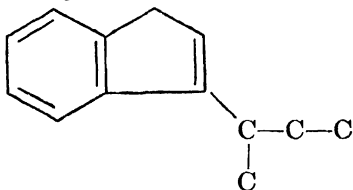
B. P., °C @ 760mm
103–104 14⁴⁹

n_D^{20}
1.5478⁴⁹

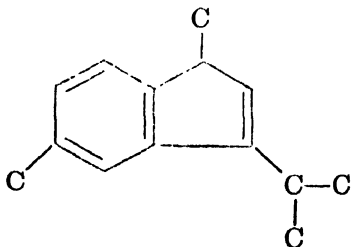
 $C_{13}H_{14}$ **1-Butylindene**

B. P., °C @ 760mm
252–255⁴⁵
120 10⁴⁵

D_4^{20}
0.9552 23° 45

3-sec-Butylindene

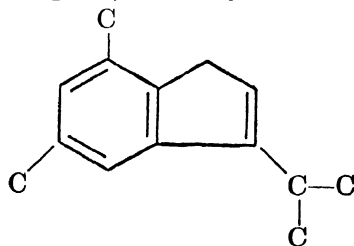
B. P., °C @ 760mm
116–118 12⁵⁵

 $C_{14}H_{18}$ **1,5-Dimethyl-3-isopropylindene (a)**

B. P., °C @ 760mm
115–120 11⁴⁹

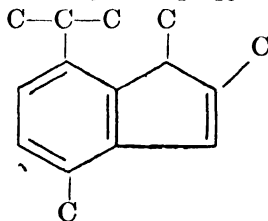
D_4^{20}
1.5395 21° 49

(a) The above formula was given for this compound, but the name given in the literature was "1-Isopropyl-3,6-dimethylindene."

3-Isopropyl-5,7-dimethylindene

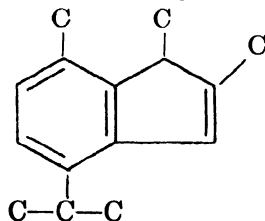
B. P., °C @ 760mm
125–130 0.2⁴⁸

n_D^{20}
1.5426 18.5° 48

 $C_{15}H_{20}$ **1,2,4-Trimethyl-7-isopropylindene**

M. P., °C
99.5⁵³

B. P., °C @ 760mm
140–145 10⁵³

1,2,7-Trimethyl-4-isopropylindene

B. P., °C @ 760mm

154-157

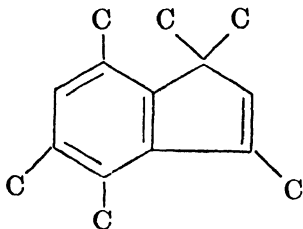
17⁴ D_4^{20}

0.9574

 $D_{25}^{25} 4$ n_D^{20}

1.5428

25° 4

1,1,3,4,5,7-Hexamethylindene

M. P., °C

87.5-88.5³⁷*References on Indene and Its Alkyl Derivatives*

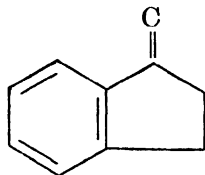
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2. INDANE WITH ONE ALKENYL OR ONE ALKYLIDENE SUBSTITUTION, C_nH_{2n-10}



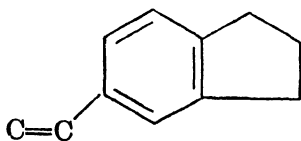
1-Methyleneindane (Dihydrobenzofulvene)



B. P., °C @ 760mm
91-93 17²

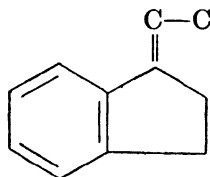


5-Ethenylindane



B. P., °C @ 760mm
95-100 10¹

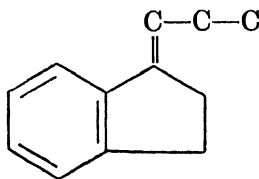
1-Ethylideneindane



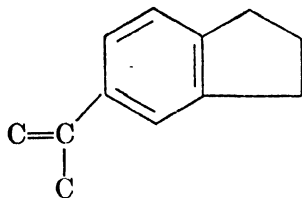
B. P., °C @ 760mm
103-105 17²



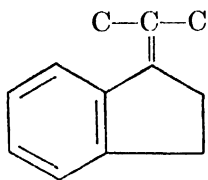
1-Propylideneindane



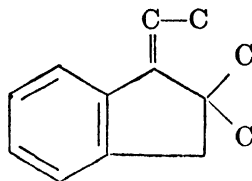
B. P., °C @ 760mm
113-115 17²

5-Isopropenylindane

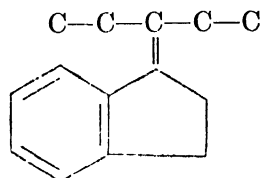
B. P., °C @ 760mm
84

2¹**1-Isopropylideneindane**

B. P., °C @ 760mm
133-135

17²C₁₃H₁₆**1-Ethylidene-2,2-dimethylindane**

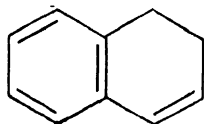
B. P., °C @ 760mm
112-114

13³C₁₄H₁₈**1-(3'-Pentylidene)-indane**

B. P., °C @ 760mm
136-138

15²*References on Indane with One Alkenyl or One Alkylidene Substitution*

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3. DIHYDRONAPHTHALENE AND ITS ALKYL DERIVATIVES,C_nH_{2n-10}C₁₀H₁₀**1,2-Dihydronaphthalene**
(Δ¹-Dialin)

M. P., °C

-8

-4²⁶-7- -5⁴⁵-8- -7⁴⁴-9- -7⁴⁵-8¹⁴, 30, 53-9- -8⁵⁵-9¹⁶, 43, 46, 55

B. P., °C @ 760mm
211

212^{10, 25}211-212²⁹210-212⁹209-210²⁶206-207¹⁷

206.5-207

764¹⁶

89-90

24⁵⁵

92.5

19⁴⁴

84

17⁴⁸

93	16 ⁴⁵
89	16 ⁵²
84.5	16 ⁵⁵
91	15 ⁵³
90	15 ⁴⁵
82-83	15 ³¹
84-85	12 ⁴⁴
83-83.5	12 ¹⁸
89	10 ⁴⁷
78	9 ⁵²
74.0-74.5	6 ¹²
83-84	5 ²⁶

 D_4^{20}

0.9966	
0.9974 ⁵⁵	
0.9904	27° 15
0.9926	25° 17
0.9931	25° 16
0.9963	21.5° 53
0.9976	18.3° 52
0.9982	18.2° 52
0.9977	18.15° 52
0.9983	18.1° 52
0.99448	14.7° 29
0.99688	12.7° 29
0.99745	12.4° 29
1.0031	10.5° 44

 n_D^{20}

1.5817 ¹⁸	
1.5782	25° 17
1.5789	25° 16
1.58317	18.3° 52
1.58326	18.1° 52
1.57399	14.7° 29
1.57549	12.7° 29
1.57494	12.4° 29
1.57637	18.3° 52 $n_{H\alpha}$
1.57655	18.1° 52 $n_{H\alpha}$
1.56827	14.7° 29 $n_{H\alpha}$
1.56981	12.7° 29 $n_{H\alpha}$
1.56910	12.4° 29 $n_{H\alpha}$
1.60088	18.3° 52 $n_{H\beta}$

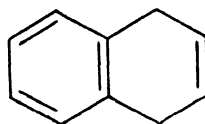
1.60101	18.1° 52 $n_{H\beta}$
1.59040	14.7° 29 $n_{H\beta}$
1.59189	12.7° 29 $n_{H\beta}$
1.59135	12.4° 29 $n_{H\beta}$
1.61720	18.3° 52 $n_{H\gamma}$
1.61738	18.1° 52 $n_{H\gamma}$

Additional Data

$$dD/dt = -0.0007473/^\circ\text{C}$$

(10 to 27°C)

1,4-Dihydronaphthalene



M. P., °C

24.5
28 ⁴⁰
25.5 ²⁶
25 ⁵²
24.5-25.0 ⁴⁷
24.5-25 ⁴⁴
24.5-24.8 ⁴³
24.5 ^{3, 18, 46}
24 ^{14, 49}
23.24 ¹⁹
16 ²²
15.5 ¹
15 ^{27, 28}

B. P., °C @ 760mm

212 ^{20, 83}	
208.5-209 ⁴⁰	
205 ²	
199-201 ⁵⁴	
211	713 ¹
94.5	17 ^{3, 44}
94	17 ⁴⁸
86.5	12 ¹⁸
84	9.5 ⁵²

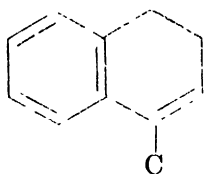
 D_4^{20}

0.9928	34.1° 52
0.9935	33.3° 52

	0.9928	32.7° ⁵²
n_D^{20}	1.5593 ¹⁸	
	1.55474	33.3° ⁵²
	1.55489	32.7° ⁵³
	1.54963	$n_{H\gamma}^{33.3\ 52}$
	1.54992	$n_{H\alpha}^{32.7\ 52}$
	1.56730	$n_{H\beta}^{33.3\ 52}$
	1.56752	$n_{H\beta}^{32.7\ 53}$
	1.57861	$n_{H\gamma}^{33.3\ 52}$
	1.57866	$n_{H\gamma}^{32.7\ 52}$

C₁₁H₁₂

4-Methyl-1,2-dihydronaphthalene



B. P., °C @ 760mm

228⁷

107-108

14³²

107

14⁴¹

92-93

14³¹

116-117

11^{50, 51}

84

5⁸ D_4^{20} 0.9901⁴¹ n_D^{20}

1.5742

25°⁸

1.5618

21.5°^{50, 51}

2-Methyl-x,x-dihydronaphthalene (a)

B. P., °C @ 760mm

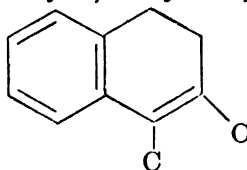
107-108

14^{50, 51} n_D^{20} 1.5522^{50, 51}

(a) The structure of this compound was not clearly defined in the literature.

C₁₂H₁₄

3,4-Dimethyl-1,2-dihydronaphthalene



B. P., °C @ 760mm

250-251⁴²

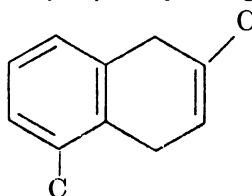
114-116

15⁴² D_4^{20}

0.9885

17°⁴² n_D^{20} 1.5763⁴²

2,5-Dimethyl-1,4-dihydronaphthalene



B. P., °C @ 760mm

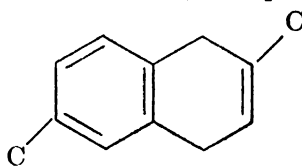
118

10²⁴ D_4^{20}

0.9700

16°²⁴

2,6-Dimethyl-1,4-dihydronaphthalene

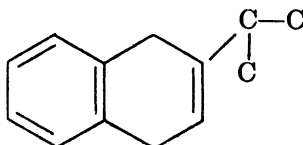


B. P., °C @ 760mm

125-126

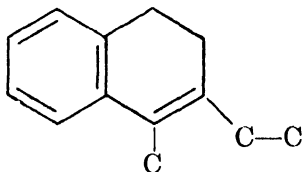
15²³C₁₃H₁₆

2-Isopropyl-1,4-dihydronaphthalene



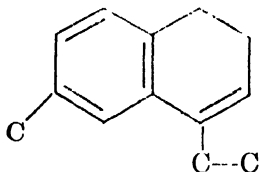
B. P., °C @ 760mm
122–127 12³⁵

3-Ethyl-4-methyl-1,2-dihydronaphthalene



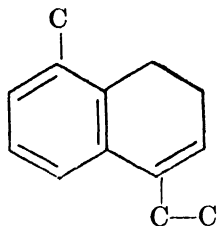
B. P., °C @ 760mm
135–145 11⁶

4-Ethyl-6-methyl-1,2-dihydronaphthalene



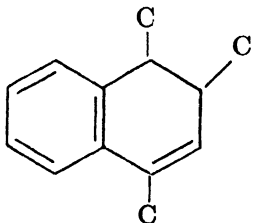
B. P., °C @ 760mm
135 16⁴

4-Ethyl-8-methyl-1,2-dihydronaphthalene



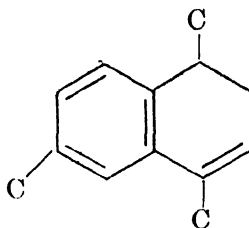
B. P., °C @ 760mm
130–131 12¹¹

1,2,4-Trimethyl-1,2-dihydronaphthalene



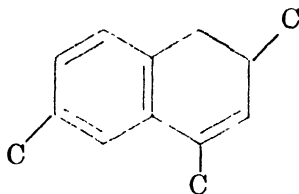
B. P., °C @ 760mm
109 11³⁶

1,4,6-Trimethyl-1,2-dihydronaphthalene



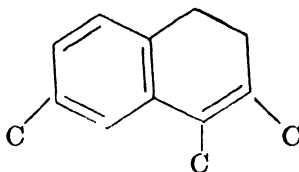
B. P., °C @ 760mm
135–138 13⁸⁶
122–123 12³⁴

2,4,6-Trimethyl-1,2-dihydronaphthalene



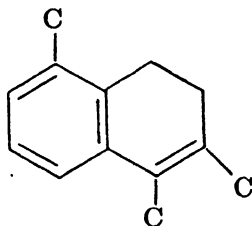
B. P., °C @ 760mm
115–117 10³⁶

3,4,6-Trimethyl-1,2-dihydronaphthalene



B. P., °C @ 760mm
145–150⁶
130 13³⁶

3,4,8-Trimethyl-1,2-dihydronaphthalene

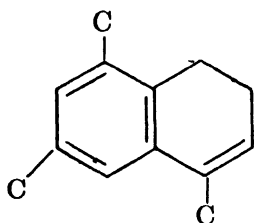


B. P., °C @ 760mm
130–131 11²⁷

D_4^{20}
0.9760²⁷

n_D^{20}
1.5672²⁷

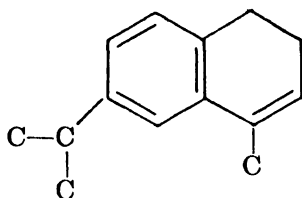
4,6,8-Trimethyl-1,2-dihydronaphthalene



B. P., °C @ 760mm
143–145 18¹³

$C_{14}H_{18}$

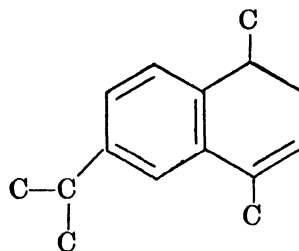
4-Methyl-6-isopropyl-1,2-dihydronaphthalene



B. P., °C @ 760mm
137 12³⁹

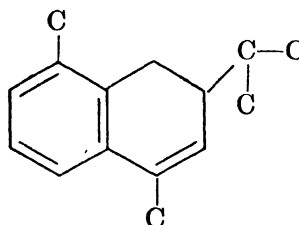
$C_{15}H_{20}$

1,4-Dimethyl-6-isopropyl-1,2-dihydronaphthalene



B. P., °C @ 760mm
154–155 12³⁸

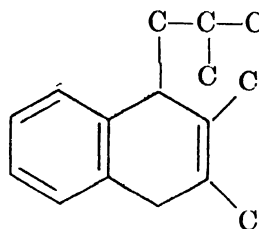
2-Isopropyl-4,8-dimethyl-1,2-dihydronaphthalene



B. P., °C @ 760mm
108 0.8³⁸

$C_{16}H_{22}$

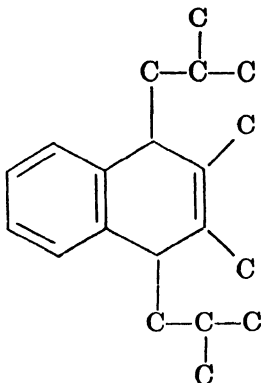
1-Isobutyl-2,3-dimethyl-1,4-dihydronaphthalene



B. P., °C @ 760mm
150²¹

$C_{20}H_{30}$

1,4-Diisobutyl-2,3-dimethyl-1,4-dihydronaphthalene



B. P., °C @ 760mm
180²¹

*References on Dihydronaphthalene and
Its Alkyl Derivatives*

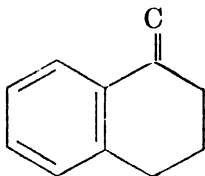
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4. TETRAHYDRONAPHTHALENE DERIVATIVES OF EMPIRICAL
 FORMULA C_nH_{2n-10}



1-Methylene-1,2,3,4-tetrahydro-
 naphthalene



B. P., °C @ 760mm

103

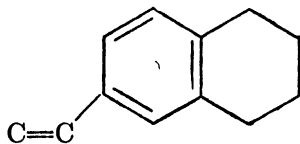
14^s

D₄²⁰

0.9836^s



6-Ethenyl-1,2,3,4-tetrahydronaphthalene



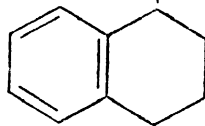
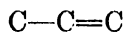
B. P., °C @ 760mm

96

2^s



1-Isopropenyl-1,2,3,4-tetrahydro-
 naphthalene

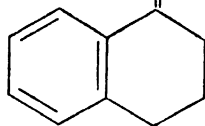
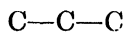


B. P., °C @ 760mm

259-261

745²

1-Isopropylidene-1,2,3,4-tetrahydro-
 naphthalene



B. P., °C @ 760mm

251-253

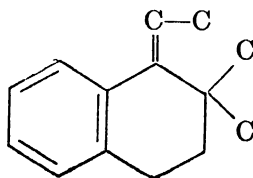
771²

245-247

744²



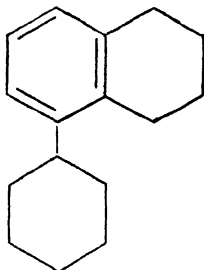
1-Ethylidene-2,2-dimethyl-1,2,3,4-
 tetrahydronaphthalene



B. P., °C @ 760mm
122-123 14⁷



5-Cyclohexyl-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm
118 0.2¹

x-Cyclohexyl-1,2,3,4-tetrahydronaphthalene (a)

B. P., °C @ 760mm
147-149 3⁶

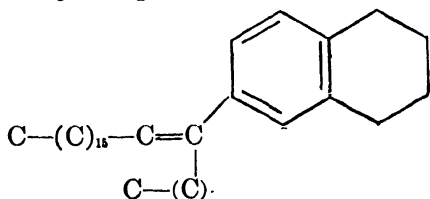
D_4^{20} 0.9891⁶
0.9939 $D_{15}^{15.6}$

n_D^{20} 1.5490⁶
1.5420 40°⁶

(a) The structure of this compound was not clearly defined in the literature.



6-(5'-Docosen-5'-yl)-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm

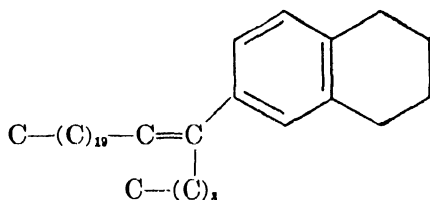
263-264 4⁴

D_4^{20} 0.890 25°³

n_D^{20} 1.5048 25°³



6-(5'-Hexacosen-5'-yl)-1,2,3,4-tetrahydronaphthalene



D_4^{20} 0.8790³

n_D^{20} 1.5030³

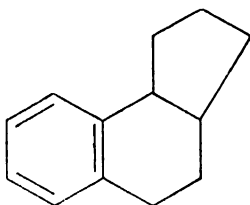
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5. CYCLOPENTANOTETRAHYDRONAPHTHALENES AND THEIR ALKYL DERIVATIVES, C_nH_{2n-10}



1,2-Cyclopentano-1,2,3,4-tetrahy- dronaphthalene



B. P., °C @ 760mm

266–267 739.2^{1, 2}
138 19⁷

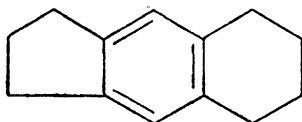
D_4^{20}

1.0090²
1.009¹
1.0054 19.4°⁷

n_D^{20}

1.5538^{1, 2}
1.55297 19.4°⁷

6,7-Cyclopentano-1,2,3,4-tetrahy- dronaphthalene

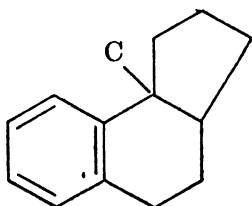


B. P., °C @ 760mm

125–126 6^{11, 12}
104–106 3⁸



1,2-Cyclopentano-1-methyl-1,2,3,4- tetrahydronaphthalene



B. P., °C @ 760mm

128 12⁷
128–132 11^{9, 10}

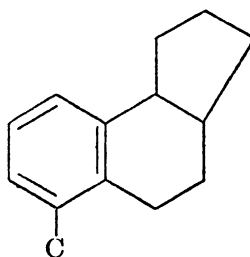
D_4^{20}

0.99798 17.8°⁷

n_D^{20}

1.5472^{9, 10}
1.54790 17.8°⁷

1,2-Cyclopentano-5-methyl-1,2,3,4- tetrahydronaphthalene



B. P., °C @ 760mm

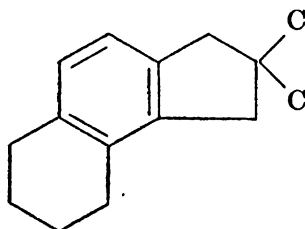
97–99 1⁸

n_D^{20}

1.5461 21°⁸



2,2-Dimethyl-4,5-cyclohexanoindane



B. P., °C @ 760mm

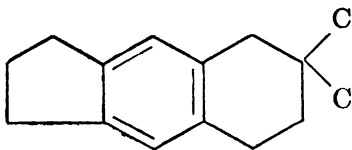
156 18^{5, 6}

D_4^{20}

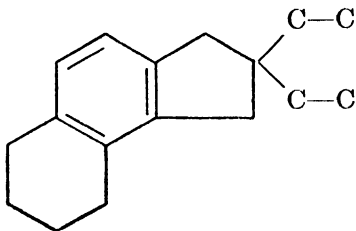
0.9685 18°⁵

n_D^{20}

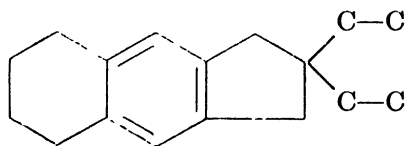
1.5320⁵

2,2-Dimethyl-6,7-cyclopentano-1,2,3,4-tetrahydronaphthalene

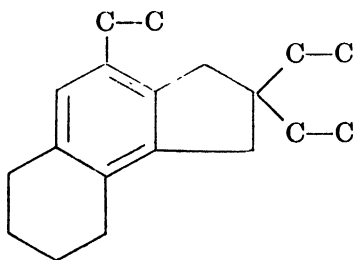
M. P., °C
82¹²

 $C_{17}H_{24}$ **2,2-Diethyl-4,5-cyclohexanoindane**

B. P., °C @ 760mm
163–165 12^{5, 6}
164–166 11¹³

2,2-Diethyl-5,6-cyclohexanoindane

M. P., °C
49^{5, 6}

 $C_{19}H_{28}$ **2,2,7-Triethyl-4,5-cyclohexanoindane**

B. P., °C @ 760mm

203–205

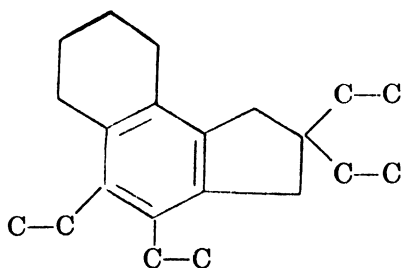
19⁴

D_4^{20}

0.9673⁴

n_D^{20}

1.5352⁴

 $C_{21}H_{32}$ **2,2,4,5-Tetraethyl-6,7-cyclohexanoindane**

B. P., °C @ 760mm

220–222

20⁴

D_4^{20}

0.9647

27°⁴

n_D^{20}

1.5365

27°⁴

*References on Cyclopentanotetrahydro-
naphthalenes and Their Alkyl
Derivatives*

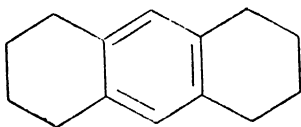
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6. OCTAHYDROANTHRACENES AND THEIR ALKYL DERIVATIVES, C_nH_{2n-10}



1,2,3,4,5,6,7,8-Octahydroanthracene (Octracene)



M. P., °C

73.3

73-74^{16, 18}72-74¹²73.5⁴73-73.5¹⁰73^{15, 21}72.0-73.0¹³72-73^{1, 8}71.6¹¹71¹⁷

B. P., °C @ 760mm

299¹293-295¹⁶

160-163

167

167

18⁸13¹12¹⁸D₄²⁰

0.9626

91.3°¹⁹

0.9648

88.8°¹⁹

0.9703

80°²¹

1.131

0°²² n_D^{20}

1.53625

88.8°¹⁹

1.5372

30°²¹

1.53230

 $n_{H\alpha}^{88.8\ 19}$

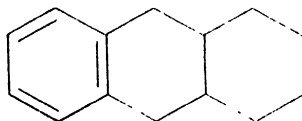
1.54791

 $n_{H\beta}^{88.8\ 19}$

1.55788

 $n_{H\gamma}^{88.8\ 19}$

1,2,3,4,4a,9,9a,10-Octahydroanthracene



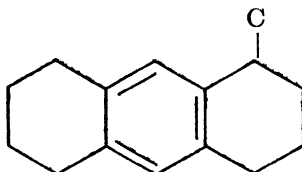
M. P., °C

71^{5, 6, 7, 17}63-64³63.5¹⁴

B. P., °C @ 760mm

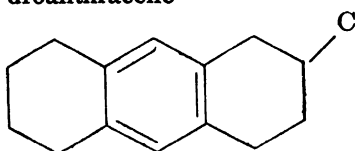
292-295^{5, 6, 7}

1-Methyl-1,2,3,4,5,6,7,8-octahydroanthracene



M. P., °C

64-66²⁰

2-Methyl-1,2,3,4,5,6,7,8-octahydroanthracene

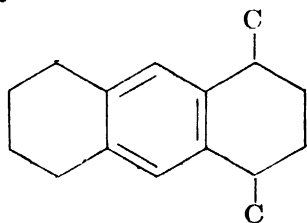
B. P., °C @ 760mm

163–165

13²⁰ D_4^{20}

0.9917

18° 20

 $C_{16}H_{22}$ **1,4-Dimethyl-1,2,3,4,5,6,7,8-octahydroanthracene**

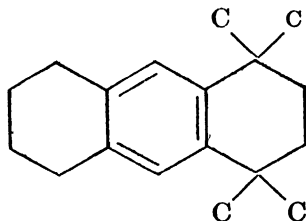
M. P., °C

90–92²⁰**9,10-Dimethyl-x₈-octahydroanthracene (a)**

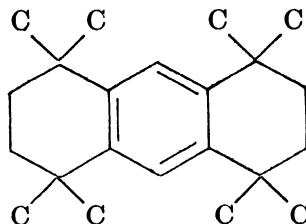
M. P., °C

140–141.5°

(a) The structure of this compound was not clearly defined in the literature.

 $C_{18}H_{26}$ **1,1,4,4-Tetramethyl-1,2,3,4,5,6,7,8-octahydroanthracene**

M. P., °C

90–91² $C_{22}H_{24}$ **1,1,4,4,5,5,8,8-Octamethyl-1,2,3,4,5,6,7,8-octahydroanthracene**

M. P., °C

220–222²*References on Octahydroanthracenes and Their Alkyl Derivatives*

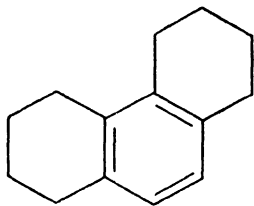
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7. OCTAHYDROPHENANTHRENES AND THEIR ALKYL DERIVATIVES, C_nH_{2n-10}



1,2,3,4,5,6,7,8-Octahydrophenanthrene (Octanthrene)



M. P., °C

16.7^{24, 25, 27, 31}16.6⁸16.5²⁶

B. P., °C @ 760mm

295^{24, 25, 36}

299

766²⁷

179-180

20³¹

172-173

20⁸

168

16.5²⁸

169

15²⁵

168-172

14²⁵

167.5

13^{24, 25, 27}

135-136

6⁸D₄²⁰1.025³⁵1.026^{24, 25}

1.0313

12.8° ³⁵ n_D^{20} 1.5668³⁵

1.5640

25° ⁸

1.5669

17° ³¹

1.57006

12.8° ³⁵

1.56588

 $n_{H\alpha}^{12.8}$ ³⁵

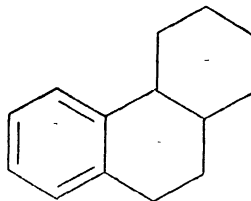
1.58189

 $n_{H\beta}^{12.8}$ ³⁵

1.59185

 $n_{H\gamma}^{12.8}$ ³⁵

1,2,3,4,4a,9,10,10a-Octahydrophenanthrene



M. P., °C

95 (b)⁸

B. P., °C @ 760mm

280-285⁸

283-284

744.5⁷

282-284

741²⁸

146-147

20¹⁴

159

15⁴

149-150

13°

123-124

13⁸135.5-135.7 (b) (c) 10.5-10.8³²

146-147	10 ¹⁸
138-139	10 ¹⁴
142.6-142.8 (a) (b)	9.2 ³²
135	9 ²
130	7 ²
135-137	6.5 ¹⁰
94-95 (b)	1.5 ¹⁹
88-90 (a)	0.1-0.15 ⁵

 D_4^{20}

1.006 (b) ⁵	
1.012 ²³	
0.997325	32° ²
0.9930	30° ²
0.9828 (b) (c)	25° ³²
0.9840 (b)	25° ¹⁹
1.0053 (a) (c)	25° ³²
1.0067	25° ¹⁸
1.0072 (a)	25° ⁵
1.0148	17° ⁷
0.993	15° ³
1.0164 (a)	13° ⁵
1.006	0° ³

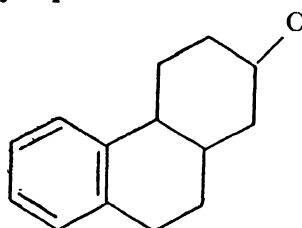
 n_D^{20}

1.5599 ²³	
1.548575	32° ²
1.54940	30° ²
1.5528	25° ^{9, 18}
1.5528 (b)	20.7° ⁵
1.5549 (a)	20.7° ⁵
1.5527	19.2° ⁴
1.5569	17° ⁷
1.537	15° ³
1.5452 (b)	15° ¹⁹
1.5460 (b) (c)	15° ³²
1.5586 (a)	12.2° ⁵
1.5592 (a) (c)	10.6° ³²

- (a) This constant was determined on the *cis* isomer of the compound.
 (b) This constant was determined on the *trans* isomer of the compound.
 (c) This constant was determined on the *dl* form of the compound.

C₁₅H₂₀

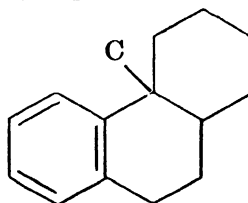
**2-Methyl-1,2,3,4,4a,9,10,10a-octa-
hydrophenanthrene**



B. P., °C @ 760mm

137 6²

**4a-Methyl-1,2,3,4,4a,9,10,10a-
octahydrophenanthrene**



B. P., °C @ 760mm

155-157	18 ¹⁴
157	16 ¹¹
145-147	10 ¹⁸
98-100	0.5-1.0 ^{15, 16}

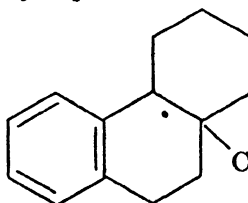
 D_4^{20}

1.0025	25° ¹⁴
1.0045	25° ¹⁸
1.0082	18.2° ¹¹

 n_D^{20}

1.5528 ^{15, 16}	
1.5508	25° ^{15, 16, 18}
1.5559	25° ¹⁴
1.55437	18.2° ¹¹

**10a-Methyl-1,2,3,4,4a,9,10,10a-
octahydrophenanthrene**



B. P., °C @ 760mm

133

2.8¹¹ D_4^{20}

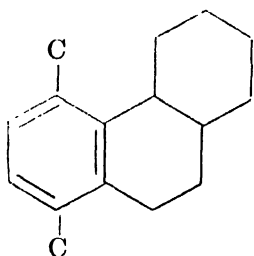
1.0054

18.5°¹¹ n_D^{20}

1.55254

18.5°¹¹C₁₆H₂₂

5,8-Dimethyl-1,2,3,4,4a,9,10,10a-octahydrophenanthrene



B. P., °C @ 760mm

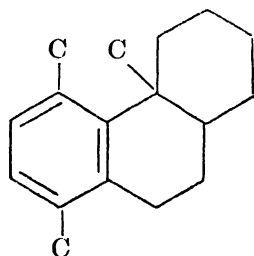
154-156

6²⁰ n_D^{20}

1.5498

25°²⁰C₁₇H₂₄

4a,5,8-Trimethyl-1,2,3,4,4a,9,10,10a-octahydrophenanthrene



B. P., °C @ 760mm

155-156

4²⁰ D_4^{20}

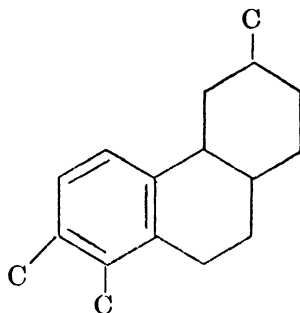
0.9975

25°²⁰ n_D^{20}

1.5460

25°²⁰

3,7,8-Trimethyl-1,2,3,4,4a,9,10,10a-octahydrophenanthrene

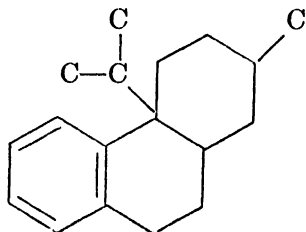


B. P., °C @ 760mm

117-120

0.06²²C₁₈H₂₆

2-Methyl-4a-isopropyl-1,2,3,4,4a,9,10,10a-octahydrophenanthrene

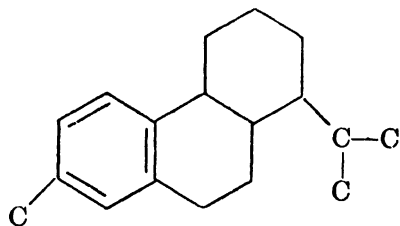


B. P., °C @ 760mm

123-127

2¹⁷

1-Isopropyl-7-methyl-1,2,3,4,4a,9,10,10a-octahydrophenanthrene



B. P., °C @ 760mm

195-197.5

19²⁸

163-165

10^{1, 24}

195-198

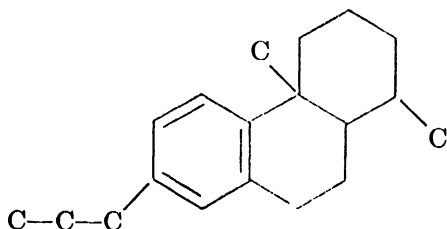
9⁸

D_4^{20} 0.9578^{1, 34}

0.9647

15°⁶ n_D^{20} 1.53020³⁴1.53023^{1, 34} $C_{19}H_{28}$

1,4a-Dimethyl-7-*n*-propyl-1,2,3,4,
4a,9,10,10a-octahydrophenan-
threne
(Pinabietene)



B. P., °C @ 760mm

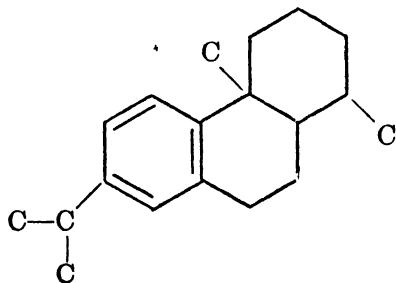
191–194

10³³

191–193

10³³ D_4^{20} 0.9734³³0.9740³³

1,4a-Dimethyl-7-isopropyl-1,2,3,4,
4a,9,10,10a-octahydrophenan-
threne
(Abietene)



B. P., °C @ 760mm

200–202

17¹²

200–202

14.5¹³

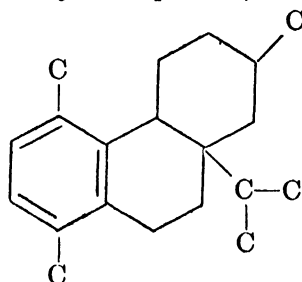
180

12²⁹ n_D^{20}

1.5354

25°²⁹ $C_{20}H_{30}$

2,5,8-Trimethyl-10a-isopropyl-1,2,3,
4,4a,9,10,10a-octahydrophenan-
threne
(Methyldextropimarín)



B. P., °C @ 760mm

140–145

0.3²¹ D_4^{20}

0.9587

22°²¹ n_D^{20}

1.5301

22°²¹

1,4a,x-Trimethyl-7-isopropyl-1,2,3,
4,4a,9,10,10a-octahydrophen-
anthrene (a)
(Methylabietene)

B. P., °C @ 760mm

194–196

6³⁰ D_4^{20}

0.9661

24°³⁰ n_D^{20}

1.53836

25°³⁰

Additional Data

 $[\alpha]_D^{24} = +110.2^\circ$ ³⁰

(a) The structure of this compound
was not clearly defined in the
literature.

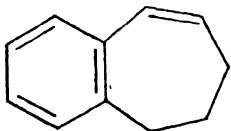
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8. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-10}



1,2-Benzocycloheptene-3

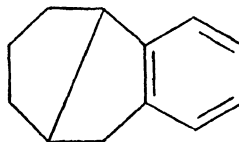


B. P., °C @ 760mm
233.5-234 757¹¹

D₄²⁰ 1.009 4° ¹¹

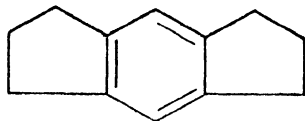


2,3-Benzobicyclo-[3,3,0]-octane



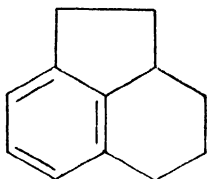
B. P., °C @ 760mm
118-124 9°

5,6-Cyclopentanoindane
(s-Hydrindacene)



M. P., °C
52–54¹

2a,3,4,5-Tetrahydroacenaphthene
(Tetraphthene) (a)



B. P., °C @ 760mm

251¹⁶

252²²

251–252¹²

245–248¹⁰

249.5 719^{2, 12}

138–139 24⁸

115 12²¹

112–115 12¹⁹

D_4^{20}

1.0065 25° 10

1.0290 21° 8

1.018 15° 19

n_D^{20}

1.59737¹⁹

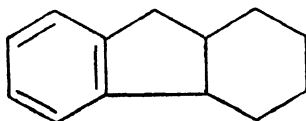
1.5550 25° 10

1.5777 21° 8

(a) Reference 21 gives this name and formula. The other references do not clearly define the structure.

$C_{13}H_{16}$

1,2,3,4,4a,9a-Hexahydrofluorene



B. P., °C @ 760mm

137 15⁴

127 15⁵

D_4^{20}

0.9880⁴

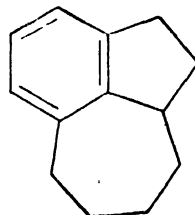
1.019 10.9° 5

n_D^{20}

1.5448⁴

1.5572 10.9° 5

Cycloheptano-[cd]-indane
(Homotetraphthene)



B. P., °C @ 760mm

127–128 12²³

D_4^{20}

1.0364 17.1° 20

1.0295 15° 28

n_D^{20}

1.5750 22° 28

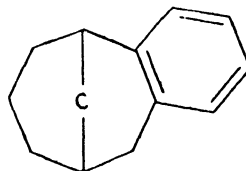
1.57362 $n_{H\alpha}^{17.1 20}$

1.59350 $n_{H\beta}^{17.1 20}$

1.60645 $n_{H\gamma}^{17.1 20}$

1.57928 $n_{He}^{17.1 20}$

2,3-Benzobicyclo-[3,3,1]-nonane



B. P., °C @ 760mm

123 15⁵

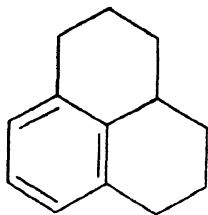
85 0.3⁵

D_4^{20}

1.020 14.0° 5

n_D^{20}

1.5580 14° 5

3a,4,5,6-Tetrahydrophenalan

B. P., °C @ 760mm

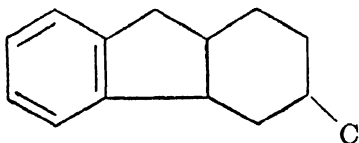
132-135

14²⁴ D_4^{20}

1.027

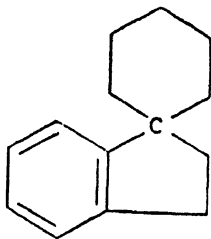
23°²⁴ n_D^{20}

1.5636

23°²⁴C₁₄H₁₈**3-Methyl-1,2,3,4,4a,9a-hexahydrofluorene**

B. P., °C @ 760mm

128

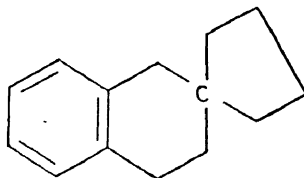
14²⁸ D_4^{20} 0.99²⁶ n_D^{20} 1.5455²⁶**Spiro[indane-1,1'-cyclohexane]**

B. P., °C @ 760mm

135.5-135.7

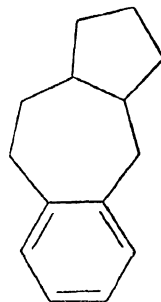
10¹⁴ n_D^{20}

1.5468

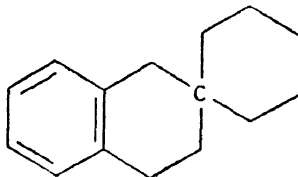
25°¹⁴**Spiro[1,2,3,4-tetrahydronaphthalene-2,1'-cyclopentane]**

B. P., °C @ 760mm

113-114

4¹⁷**1,2-Cyclopentano-4,5-benzocycloheptane
(Octahydrobenzazulene)**

M. P., °C

29-30⁶C₁₅H₂₀**Spiro[1,2,3,4-tetrahydronaphthalene-2,1'-cyclohexane]**

B. P., °C @ 760mm

115-117

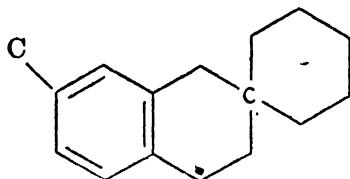
3¹⁸ D_4^{20}

0.98886

30.4°¹⁸ n_D^{20}

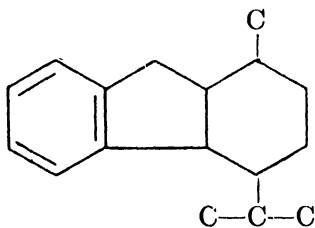
1.54314

30°¹⁸

$C_{16}H_{22}$ Spiro[7-methyl-1,2,3,4-tetrahydro-
naphthalene-2,1'-cyclohexane]

B. P., °C @ 760mm

155-156

8¹⁸ $C_{17}H_{24}$ 1-Methyl-4-isopropyl-1,2,3,4,4a,9a-
hexahydrofluorene

B. P., °C @ 760mm

153-155

10²⁵

150

10¹⁵

105

0.6¹⁵ D_4^{20}

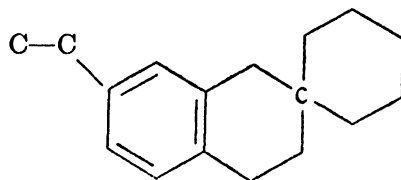
0.9843

21° 15

 n_D^{20}

1.5397

21° 15

Spiro[7-ethyl-1,2,3,4-tetrahydro-
naphthalene-2,1'-cyclohexane]

B. P., °C @ 760mm

168-169

8¹⁸ D_4^{20}

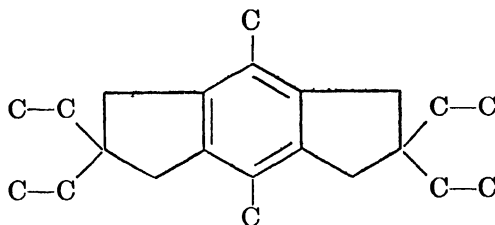
0.972787

24° 18

 n_D^{20} 1.538808¹⁸*This series continued on next page*

C₂₂H₃₄

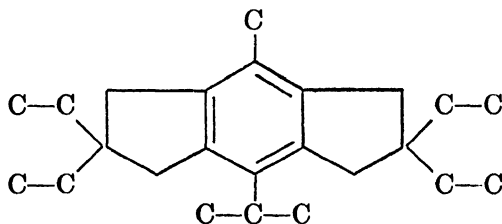
1,4-Dimethyl-2,3,5,6-di-[2',1'-
(4',4'-diethylcyclopentano)]-
benzene



M. P., °C
69-71⁹

C₂₄H₃₈

1-Methyl-4-isopropyl-2,3,5,6-di-
[2',1'-(4',4'-diethylcyclopentano)]-benzene



M. P., °C
69-71⁷

B. P., °C @ 760mm
215-220 12⁷

D_4^{20}
0.9466 22°⁷

n_D^{20}
1.5247⁷

*References on Miscellaneous Polynuclear
Aromatics of Empirical Formula*

C_nH_{2n-10}

- | | |
|---|---|
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|---|---|

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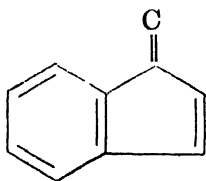
III. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-12}

1. Indene with One Alkenyl or One Alkylidene Substitution
2. Naphthalene and Its Alkyl Derivatives
3. Miscellaneous Polynuclear Aromatics of Empirical Formula C_nH_{2n-12}

1. INDENE WITH ONE ALKENYL OR ONE ALKYLIDENE
SUBSTITUTION, C_nH_{2n-12}



1-Methyleneindene

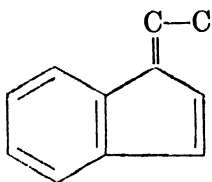


M. P., °C
37^{3, 4}

B. P., °C @ 760mm
95-97 17³

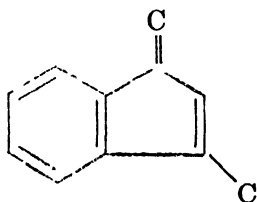


1-Ethylideneindene



B. P., °C @ 760mm
119-121 17³

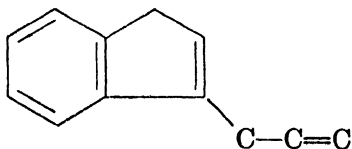
1-Methylene-3-methylindene



B. P., °C @ 760mm
102-104 11⁸

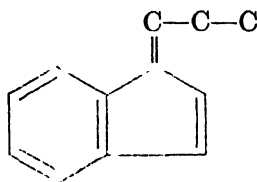


3-(Propen-2'-yl)-indene



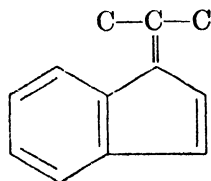
B. P., °C @ 760mm
138 27⁷

1-Propylideneindene

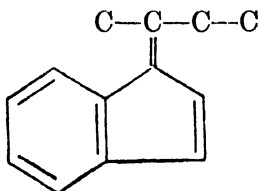


B. P., °C @ 760mm
140-141 20³

1-Isopropylideneindene



B. P., °C @ 760mm
142 16⁶
129-130 8³

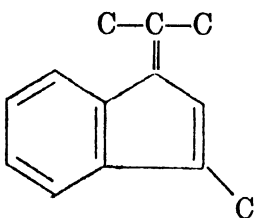
1-*sec*-Butylideneindene

B. P., °C @ 760mm

151-152

15^s

1-Isopropylidene-3-methylindene



M. P., °C

51²49¹48-49⁹

B. P., °C @ 760mm

145-148

11¹

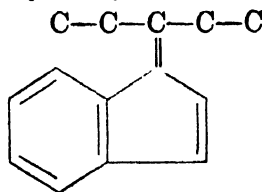
144-148

11⁹

105

0.2-0.5⁹

1-(3'-Pentylidene)-indene

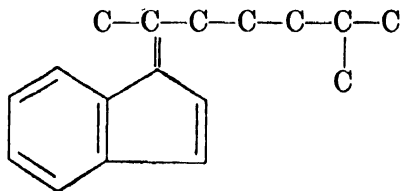


B. P., °C @ 760mm

140-142

15^s

2-Methyl-6-indenylideneheptane



B. P., °C @ 760mm

120

0.2^s D_4^{20}

0.9666

23°^s n_D^{20}

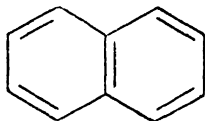
1.5733

23°^s*References on Indene with One Alkenyl or One Alkylidene Substitution*

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2. NAPHTHALENE AND ITS ALKYL DERIVATIVES, C_nH_{2n-12} 

Naphthalene



M. P., °C

80.0₁
 81 (a)
 80.98 ± 0.15 (b)²²⁵
 80.8^{102, 191, 193}
 80-80.7²²⁴
 80.6¹²⁶
 80.5^{44, 114}
 80.4-80.5¹⁰³
 80.0-80.5²⁰⁸
 80-80.5⁴⁵
 80.4^{162, 263}
 80.3¹¹⁷
 80.3 (c)¹¹⁶
 80.25-80.30²⁶⁷
 80.24 ± 0.01 (c)¹⁴¹
 80.23⁵⁸
 80.21⁵⁸
 80.20²⁰⁷
 80.2^{211, 238, 281}
 80.15^{27, 140}
 80.12²²⁸
 80.10-80.12²²⁹
 80.10^{51, 52, 74, 231}
 80.1 (d)
 80.05-80.1 (c)²⁶⁶
 79.9-80.1¹³⁹
 80.09²⁶⁸
 80.08⁶⁷
 80.05-80.07¹⁷
 80.061 ± 0.002¹⁶⁵
 80.06^{39, 137, 147}
 80.05^{28, 100, 133}
 80.04²⁶¹
 80.00^{40, 94}

80.0^{26, 115, 117, 138, 167, 194, 222}

80 (e)

79.9-80²²⁰79.5-80.0²⁰⁹79.5-80²¹⁶79.95²⁸¹79.91^{4, 5}79.9^{18, 19, 168, 210}79.87^{12, 56, 237}79.866¹⁹⁷79.86⁸⁸79.6-79.8²⁶⁹79.7¹⁵⁰79.60-79.64¹⁷⁹79.60¹⁴³79.6⁷⁰

79.5 (f)

79.4^{86, 156}79.33¹²³79.32¹²³79.3^{157, 201, 279}79.25²⁵⁴79.2^{6, 110, 206}

79 (g)

atm.

190.1

3,494 (b)^{230, 231}

180.1

3,097 (b)^{230, 231}

169.8

2,724 (b)²³¹

170.1

2,712 (b)²³⁰

159.8

2,405 (b)²³¹

150.1

2,061 (b)²³⁰

148.9

2,035 (b)²³¹

138.8

1,719²³¹

138.9

1,705 (b)²³¹

129.91

1,450 (b)²³¹

130

1,430¹¹

129.92

1,416²³¹

125.01

1,325 (b)²³¹

119.92

1,155²³¹

120.1

1,151 (b)²³⁰

115.06

1,016 (b)²³¹

110.02

853²³¹

110.01

853²³¹

105.71	740 (b) ²³¹	217.9 ²⁶	
99.98	561 ²³¹	217.8 ¹⁶⁹	
100	560 ¹¹	217.68 ¹⁰⁰	
95.21	429 (b) ²³¹	269.51	2,149.31 ⁵⁵
91.14	300 ⁹⁴	267.03	2,052.28 ⁵⁵
91.10	300 ⁹⁴	264.45	1,957.02 ⁵⁵
89.11	281 (b) ²³¹	263.01	1,912.86 ⁵⁵
89.97	278 ²³¹	259.26	1,784.83 ⁵⁵
90.25	275 ⁹⁴	255.65	1,657.39 ⁵⁵
90	275 ¹¹	253.93	1,600.94 ⁵⁵
89.20	250 ⁹⁴	249.92	1,489.60 ⁵⁵
88.35	225 ⁹⁴	247.58	1,413.80 ⁵⁵
87.45	200 ⁹⁴	245.99	1,378.68 ⁵⁵
86.45	175 ⁹⁴	243.98	1,317.86 ⁵⁵
86.01	173 (b) ²³¹	243.32	1,306.75 ⁵⁵
85.50	150 ⁹⁴	241.34	1,252.27 ⁵⁵
84.50	125 ⁹⁴	238.79	1,184.58 ⁵⁵
83.51	106 (b) ²³¹	236.25	1,111.33 ⁵⁵
83.65	100 ⁹⁴	234.68	1,086.63 ⁵⁵
83	80 ¹¹	234.50	1,082.12 ⁵⁵
82.80	75 ⁹⁴	233.94	1,070.92 ⁵⁵
81.80	50 ⁹⁴	230.86	1,002.31 ⁵⁵
80.85	25 ⁹⁴	228.55	958.26 ⁵⁵
80.10	0 ²³¹	227.02	927.75 ⁵⁵
79.95	0 ⁹⁴	225.39	894.87 ⁵⁵
B. P., °C @ 760mm		224.1	881.0 ¹⁷⁰
217.98		223.9	879.7 ¹⁷⁰
218.47 (b) ⁵⁵		223.8	878.5 ¹⁷⁰
218.2 ^{88, 124}		224.45	877.29 ⁵⁵
218.12 ²⁴⁶		221.45	825.2 ¹⁷⁵
218.06 ^{42, 55, 100}		221.35	816.78 ⁵⁵
218.050 (b) ⁸⁹		220	800 ³⁸
218.05 (h)		219.95	800 ¹⁰⁰
218.04 ⁷		219.68	795 ¹⁰⁰
218.0 ± 0.02 ²⁴³		219.40	790 ¹⁰⁰
218.0 ^{170, 195, 214, 263, 264}		219.11	785 ¹⁰⁰
218 (i)		218.83	780 ¹⁰⁰
217.8–218.0 ⁹³		218.54	775 ¹⁰⁰
217.98 ± 0.01 ^{250, 263}		218.25	770 ¹⁰⁰
217.97 ₃ ⁶⁶		217.4–217.8	769 ¹⁵⁴
217.96 ^{39, 90, 147, 242, 249}		218.5	767.63 ⁵⁴
217.96 ± 0.03 ¹⁴¹		217.97	765 ¹⁰⁰
217.95 ⁷³		218.5	763 ¹³
217.94 ⁴¹		218.152 (b)	762.02 ⁸⁹

218.047 (b)	760.37 ⁸⁹	206.84	590 ¹⁰⁰
218.061 (b)	760.24 ⁸⁹	207.00	589.70 ⁵⁵
217.87	759.2 ¹⁷⁵	206.92	584.01 ⁵⁵
217.34	755.8 ¹⁷⁵	206.00	581.9 ¹⁷⁵
217.40	755 ¹⁰⁰	206.12	580 ¹⁰⁰
217.6	752.20 ⁵⁴	205.78	576.2 ¹⁷⁵
217	751 ¹⁰⁸	206.05	576.18 ⁵⁵
217.6	750.1 ⁸⁸	205.40	570 ¹⁰⁰
217.11	750 ¹⁰⁰	205.31	564.76 ⁵⁵
216.4-216.8	747.6 ¹¹⁰	204.66	560 ¹⁰⁰
216.82	745 ¹⁰⁰	203.91	550 ¹⁰⁰
216.89	744 ¹⁵⁵	203.15	540 ¹⁰⁰
216.7	741.9 ¹⁸⁷	203.26	538.37 ⁵⁵
216.53	740 ¹⁰⁰	202.37	530 ¹⁰⁰
216.45	737.6 ¹⁷⁰	202.2	520.0 ¹⁷⁰
216.4	737.6 ¹⁷⁰	201.59	520 ¹⁰⁰
216.7	736.99 ⁵⁴	202.2	519.0 ¹⁷⁰
216.24	735 ¹⁰⁰	202.1	518.5 ¹⁷⁰
215.95	730 ¹⁰⁰	200.80	510 ¹⁰⁰
215.65	725 ¹⁰⁰	200.50	505.7 ¹⁷⁵
215.7	720.39 ⁵⁴	200	502.1 ⁶⁰
215.36	720 ¹⁰⁰	200.00	500 ¹⁰⁰
215.06	715 ¹⁰⁰	200	500 ³⁸
214.76	710 ¹⁰⁰	199.18	490 ¹⁰⁰
215.07	708.93 ⁵⁵	198.99	484.84 ⁵⁵
214.45	705 ¹⁰⁰	198.53	482.1 ¹⁷⁵
214.14	700 ¹⁰⁰	198.34	480 ¹⁰⁰
214	700 ³⁸	197.48	470 ¹⁰⁰
213.51	690 ¹⁰⁰	196.96	464.1 ¹⁷⁵
213.30	682.7 ¹⁷⁵	196.60	460 ¹⁰⁰
212.87	680 ¹⁰⁰	196.85	458.41 ⁵⁵
212.23	670 ¹⁰⁰	196.72	458.31 ⁵⁵
212.17	667.8 ¹⁷⁵	194.78	440 ¹⁰⁰
212.06	660.16 ⁵⁵	193.85	430 ¹⁰⁰
211.58	660 ¹⁰⁰	192.91	420 ¹⁰⁰
210.94	650 ¹⁰⁰	193.05	417.97 ⁵⁵
210.28	640 ¹⁰⁰	191.96	410 ¹⁰⁰
209.60	630 ¹⁰⁰	191.00	400 ¹⁰⁰
209.83	627.85 ⁵⁵	191	400 ³⁸
209.62	625.95 ⁵⁵	191.28	398.89 ⁵⁵
208.93	620 ¹⁰⁰	191.20	397.68 ⁵⁵
208.24	610 ¹⁰⁰	190.66	391.40 ⁵⁵
208	600 ³⁸	190.02	390 ¹⁰⁰
207.55	600 ¹⁰⁰	189.02	380 ¹⁰⁰

188.36	369.77 ⁵⁵	115	32.40 ¹⁰
187.43	358.98 ⁵⁵	113.0	32.2 ¹⁷⁰
185.34	347.6 ¹⁷⁵	109.65	28.7 ¹⁷⁵
184.90	337.43 ⁵⁵	110	27.30 ¹⁰
184.56	334.20 ⁵⁵	104.39	22.9 ¹⁷⁵
183.89	326.22 ⁵⁵	105	22.40 ¹⁰
181.20	310.6 ¹⁷⁵	102	20 ³⁸
180.80	300.82 ⁵⁵	100	18.50 ¹⁰
180	300 ³⁸	100.00	18.5 ¹⁷⁵
180	299.1 ⁶⁰	100	18.5 ^{3, 60}
178.44	290.0 ¹⁷⁵	98.1	18.3 ¹⁷⁰
179.39	289.22 ⁵⁵	95	15.50 ¹⁰
178.92	286.60 ⁵⁵	95.00	15.5 ¹⁷⁵
178.41	281.55 ⁵⁵	95	15.5 ³
178.0	275.2 ¹⁷⁰	90	12.60 ¹⁰
177.11	272.34 ⁵⁵	90	12.6 ³
177.3	269.7 ¹⁷⁰	87.47	11.9 ¹⁷⁵
175.10	260.8 ¹⁷⁵	87.4	11.9 ¹⁷⁰
173.14	243.53 ⁵⁵	87.2	11.4 ¹⁷⁰
172.05	235.21 ⁵⁵	87	10 ³⁸
171.23	231.16 ⁵⁵	85	9.80 ¹⁰
166	200 ³⁸	85	9.8 ³
163.13	187.1 ¹⁷⁵	80	7.40 ¹⁰
163.9	181.8 ¹⁷⁰	80	7.4 ³
160	172 ¹³	75	5.43 ³
160	168.4 ⁶⁰	74	5 ³⁸
160.9	168.1 ¹⁷⁰	70	4 ³⁸
158.95	165.1 ¹⁷⁵	70	3.95 ³
149.7	117.9 ¹⁷⁰	70	3.9 ¹⁴⁶
148.7	114.5 ¹⁷⁰	65	2.65 ³
147.8	111.4 ¹⁷⁰	60	1.83 ³
144.45	103.5 ¹⁷⁵	59.76	1.780 ²³⁸
144	100 ³⁸	55	1.26 ³
140	88.7 ⁶⁰	55	1 ¹⁴⁶
138	80 ³⁸	50	0.815 ²²¹
133.72	71.2 ¹⁷⁵	50	0.81 ³
132.6	67.0 ¹⁷⁰	49.94	0.801 ²³⁸
131.1	63.2 ¹⁷⁰	44.86	0.526 ²³⁸
130	61.90 ¹⁰	45	0.518 ²²¹
130.25	61.2 ¹⁷⁰	45	0.51 ³
128.06	58.7 ¹⁷⁵	40	0.35 ¹⁴⁶
128.51 ± 0.10	57.78 ¹⁴¹	40	0.320 ²²¹
117.15	38.3 ¹⁷⁵	39.70	0.320 ²³⁸
114.70	35.9 ¹⁷⁵	40	0.32 ³

34.60	0.218 ²³⁸	0.9632	100.86° ⁸⁸
35	0.210 ²²¹	0.9630	100.04° ⁸⁸
35	0.21 ³	0.9609	100° ⁶⁸
35	0.195 ¹⁵³	0.96248 (b)	100° ¹⁴⁷
30	0.135 ³	0.9643	99.8° ²⁵⁵
30	0.133 ²²¹	0.9641	99.6° ²⁵⁶
29.62	0.128 ²³⁸	0.9645	99.6° ^{120, 255}
25	0.103 ³	0.9629	99.5° ¹²¹
24.80	0.0845 ²³⁸	0.9631	99.3° ¹²¹
25	0.082 ²²¹	0.9630	99.2° ¹²¹
20	0.080 ³	0.9628	$D_0^{99\ 02\ 4,\ 5}$
15	0.062 ³	0.9634 ₅ (b)	99.0° ²¹⁹
20	0.06 ¹⁵³	0.96208	98.4° ¹⁷⁴
20	0.0545(b)	0.9621	98.4° ³³
	10, 37	1.0056	$D_{95}^{95\ 195}$
20	0.054 ²²¹	0.9696	91.45° ²⁷
19.86	0.0500 ²³⁸	0.9685	90° ⁶⁸
10	0.047 ³	0.9696	90° ¹²²
15	0.0376(b) ¹⁰	0.97056 (b)	90° ¹⁴⁷
15	0.035 ²²¹	0.9715	87.29° ⁸⁸
5	0.034 ³	0.9757	85.30° ²⁶¹
12.98	0.0233 ²³⁸	0.9752 ± 0.0002	85° ¹⁴¹
0	0.023(b) ¹⁰	0.9757	85° ²⁵⁵
0	0.022 ³	1.0070	$D_{85}^{85\ 195}$
10	0.021 ²²¹	0.9746	84.55° ²⁷
5	0.010 ²²¹	0.9766 (b)	82.2° ²¹⁹
0	0.006 ²²¹	0.97703 (b)	82° ¹⁴⁷
0	0.00538 ²³⁸	0.9759	81.92° ⁸⁸
D_4^{20}		0.9771	80.76° ⁸⁸
0.9628 ₃	100°	0.9790	80° ¹²²
1.035 ¹²⁰		0.9777	79.9° ⁷²
1.036 ¹²⁰		0.9778	79.2° ²²⁰
1.110 ²⁶		0.9790	78.45° ²⁷
1.152 (solid) ²¹²		0.9799	77.35° ²⁷
1.158 (solid) ²¹⁵		0.9813	75.04° ²⁷
1.172 (solid) ¹⁷¹		0.9830	72.61° ²⁷
1.175 (solid) ²⁰³		0.9850	70.10° ²⁷
0.889	187.8° ²¹⁷	0.9877	66.71° ²⁷
0.8962	177.2° ⁶⁴	0.9991	50° ⁶⁸
0.912	164.8° ²¹⁷	1.1675 (solid)	31.51° ²⁷
0.9212	152° ¹²²	1.149	25° ¹¹⁹
0.9400	127.0° ⁶⁴	1.1789 (b)	23.9° ⁸⁷
0.9456	120° ⁶⁸	1.168	22° ⁷⁵
0.95040 (b)	115° ¹⁴⁷	1.170	18° ⁷⁵

n_D^{20}

1.1589 (solid)	17° 59
1.1708 (solid)	15.71° 27
1.1517	15° 92
1.15173	15° 254
1.1788 (solid)	8.31° 27
1.0373	0° 68
1.2355 (solid)	-188° 59
1.58214	100°
1.618120	
1.619120	
1.5330	187.8° 217
1.5467	164.8° 217
1.5695	124.8° 217
1.5760	111.3° 217
1.58218	99.6° 120, 255
1.58269	99.6° 256
1.58291	99.5° 121
1.58276	99.3° 121
1.58276	99.2° 121
1.58232	98.4° 174
1.58987	85.30° 273
1.58996	85.30° 261
1.5898 ± 0.0002	85° 141
1.5917	82.8° 217
1.601	80° 83
1.57472	$n_{H\alpha}^{99.6\ 120, 255}$
1.57509	$n_{H\alpha}^{99.6\ 256}$
1.57535	$n_{H\alpha}^{99.5\ 121}$
1.57524	$n_{H\alpha}^{99.3\ 121}$
1.57520	$n_{H\alpha}^{99.2\ 121}$
1.57456	$n_{H\alpha}^{98.4\ 174}$
1.5746	$n_{H\alpha}^{98.4\ 33}$
1.57375	$n_{H\alpha}^{85\ 255}$
1.60328	$n_{H\beta}^{99.6\ 120, 255}$
1.60378	$n_{H\beta}^{99.6\ 256}$
1.60401	$n_{H\beta}^{99.5\ 121}$
1.60387	$n_{H\beta}^{99.3\ 121}$
1.60386	$n_{H\beta}^{99.2\ 121}$
1.60310	$n_{H\beta}^{98.4\ 174}$
1.62261	$n_{H\gamma}^{99.6\ 120, 255}$

1.62295

 $n_{H\gamma}^{99.6\ 256}$

(j)

Additional Data

Crit. Temp. (°C)

474.84

468.2^{78, 85}468.0²⁶⁵

Crit. Pressure (mm Hg)

29,792.0⁸⁵ $t_m = 79.975 + 0.03614 p_{atm}$ $-0.000001187 p_{atm}^2$

(1 to 3,500 atm)

$$\frac{1}{T_b} = 0.00326573$$

 $-0.00042695 \log_{10} p_{mm}$

(900 to 2,150 mm)

$$\frac{1}{T_b} = 0.00324419$$

 $-0.00041936 \log_{10} p_{mm}$

(300 to 900 mm)

$$\frac{1}{T_b} = 0.00320848$$

 $-0.00040522 \log_{10} p_{mm}$

(35 to 300 mm)

$$\frac{dD}{dt} = -0.00077163 [1 + 0.001933 (t - 100)]/^\circ C$$

(60 to 190°C)

$$\frac{dn}{dt} = -0.0005509/^\circ C$$

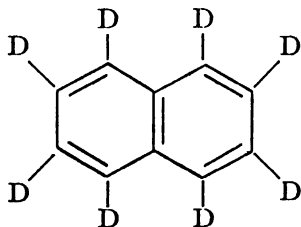
(80 to 190°C)

- The melting point 81 is found in references 14, 15, 91, 112, 145, 192, 199, 262.
- This constant is the average of two or more determinations.
- This constant was given as a freezing point in the literature.
- The melting point 80.1 is found in references 65, 163, 170, 196, 219, 227, 231, 242, 272.
- The melting point 80 is found in references 1, 10, 16, 24, 29, 30, 31, 32, 34, 36, 46, 49, 53, 61, 72, 76,

80, 95, 97, 101, 104, 105, 107, 109, 118, 119, 121, 122, 125, 127, 144, 149, 158, 160, 166, 172, 174, 176, 177, 180, 181, 183, 186, 200, 202, 212, 215, 218, 223, 226, 232, 233, 239, 241, 244, 245, 247, 248, 252, 257, 259, 271, 275, 276, 278, 280, 282.

- (f) The melting point 79.5 is found in references 25, 43, 158, 164, 183, 184, 213.
- (g) The melting point 79 is found in references 2, 8, 9, 20, 21, 22, 35, 47, 57, 62, 63, 69, 77, 79, 81, 82, 92, 98, 111, 135, 138, 142, 151, 152, 159, 178, 182, 185, 190, 204, 205, 234, 245, 247, 251, 253, 256, 258, 270, 274, 277.
- (h) The boiling point 218.05 is found in references 7, 128, 129, 130, 131, 132, 133, 240.
- (i) The boiling point 218 is found in references 13, 20, 21, 22, 23, 38, 57, 71, 92, 99, 101, 106, 113, 119, 134, 148, 152, 160, 161, 188, 189, 198, 235, 236, 244, 247, 248, 252, 260, 265, 269.
- (j) Refractive indices at other lines are found in reference 173.

Octadeuteronaphthalene



M. P., °C

80–81⁵⁰

77.5⁴⁸

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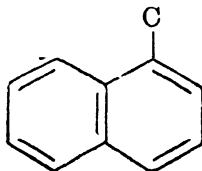
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C₁₁H₁₀

1-Methylnaphthalene



M. P., °C

-30.9

-30.77 \pm 0.06¹⁹-30.90 \pm 0.01 (a)⁶¹-31²⁵-31.9¹⁹-33--31⁶⁷-33--32²⁰

B. P., °C @ 760mm

244.74

244.8⁸⁰244.78¹⁹244.78 \pm 0.10⁶¹244.6⁵⁵244.4²⁵243-244¹⁶242.5-243.5⁴⁰240.4-242.6³⁵241-242^{66, 110}244-245 766²⁰243.5-244.1 763⁵⁵241.5-242 749⁷⁷151.3 \pm 0.2 57.8⁶¹148.9 56¹⁹145 55²121-123 20¹⁰⁸117-120 12-13⁵⁶108.6-108.8 11³⁵108-109 10⁴¹100-105 10¹14.6 0.031⁶⁰ D_4^{20}

1.0120

1.020²⁵1.0212¹¹²0.9606 100.2° ¹⁰⁹0.9644 100.1° ¹¹²0.9604 100.0° ¹⁰⁹0.9611 100° ²⁵0.9632 100.0° ¹¹²0.9606 99.5° ¹⁰⁹0.9617 99.4° ¹⁰⁹0.9771 78.3° ¹¹²0.9979 50° ²⁵1.0163 \pm 0.00011.0163 \pm 0.0002

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1.0250

1.0248

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1.0267

1.0347

25° ⁶¹25° ³⁹24.7° ¹⁰⁷24.0° ¹¹²23.9° ¹¹²23.3° ¹⁰⁹22.6° ¹⁰⁹21.6° ¹⁰⁹21.3° ¹⁰⁹20.9° ¹⁰⁹20.6° ¹⁰⁹20.5° ¹⁰⁹19.8° ¹¹¹19.8° ¹⁰⁹19.7° ¹¹²19.7° ¹¹²19.3° ¹¹²19.2° ¹¹²18.9° ¹¹²18.2° ¹⁰⁹18.2° ¹¹²18.2° ¹¹²17.8° ¹⁰⁹17.6° ¹¹²17.0° ¹¹¹17° ⁴¹16.8° ¹¹²14.4° ¹¹²13.6° ¹¹⁰13.6° ¹¹²11.5° ¹¹⁸0° ²⁵ n_D^{20} 1.6157²⁰1.6167⁷⁷1.6172²⁵1.58077 99.2° ¹¹⁰1.5882 40° ¹¹⁶1.6140 \pm 0.0002 25° ³⁹1.6145 25° ²⁵1.61494 \pm 0.00010 25° ⁶¹1.6165 18.5° ⁷⁴1.6175 17° ⁴¹1.6197 15° ²⁵

1.62124	13.6° 110	1.61051	$n_{H\alpha}^{16.7\ 112}$
1.57226	$n_{H\alpha}^{100.2\ 109}$	1.61126	$n_{H\alpha}^{15.0\ 112}$
1.57225	$n_{H\alpha}^{100.1\ 112}$	1.61130	$n_{H\alpha}^{14.9\ 112}$
1.57226	$n_{H\alpha}^{100.0\ 109}$	1.61121	$n_{H\alpha}^{14.4\ 112}$
1.57252	$n_{H\alpha}^{100.0\ 112}$	1.61174	$n_{H\alpha}^{13.6\ 112}$
1.57244	$n_{H\alpha}^{99.5\ 109}$	1.61300	$n_{H\alpha}^{13.6\ 110}$
1.57235	$n_{H\alpha}^{99.4\ 109}$	1.60025	$n_{H\beta}^{100.2\ 109}$
1.57353	$n_{H\alpha}^{99.2\ 110}$	1.60018	$n_{H\beta}^{100.1\ 112}$
1.58292	$n_{H\alpha}^{78.3\ 112}$	1.60034	$n_{H\beta}^{100.0\ 109}$
1.60677 ± 0.00010	$n_{H\alpha}^{25\ 61}$	1.60043	$n_{H\beta}^{99.5\ 109}$
1.60687	$n_{H\alpha}^{24.7\ 107}$	1.60285	$n_{H\beta}^{99.4\ 109}$
1.60750	$n_{H\alpha}^{24.0\ 112}$	1.60159	$n_{H\beta}^{99.2\ 110}$
1.60754	$n_{H\alpha}^{23.9\ 112}$	1.63672 ± 0.00010	$n_{H\beta}^{25\ 61}$
1.60786	$n_{H\alpha}^{23.3\ 109}$	1.63680	$n_{H\beta}^{24.7\ 107}$
1.60811	$n_{H\alpha}^{22.6\ 109}$	1.63740	$n_{H\beta}^{24.0\ 112}$
1.60846	$n_{H\alpha}^{21.6\ 109}$	1.63744	$n_{H\beta}^{23.9\ 112}$
1.60846	$n_{H\alpha}^{21.3\ 109}$	1.63776	$n_{H\beta}^{23.3\ 109}$
1.59156	$n_{H\alpha}^{20.9\ 109}$	1.63800	$n_{H\beta}^{22.6\ 109}$
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1.61007	$n_{H\alpha}^{18.2\ 109}$	1.64000	$n_{H\beta}^{18.2\ 112}$
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1.61052	$n_{H\alpha}^{17.0\ 111}$	1.64008	$n_{H\beta}^{17.2\ 112}$
1.61042	$n_{H\alpha}^{16.9\ 112}$	1.64060	$n_{H\beta}^{17.0\ 111}$
1.61051	$n_{H\alpha}^{16.8\ 112}$	1.64050	$n_{H\beta}^{16.9\ 112}$
		1.64068	$n_{H\beta}^{16.8\ 112}$

1.64050	$n_{\text{He}}^{16.7 \ 112}$
1.64143	$n_{\text{He}}^{15.0 \ 112}$
1.64147	$n_{\text{He}}^{14.9 \ 112}$
1.64146	$n_{\text{He}}^{14.4 \ 112}$
1.64214	$n_{\text{He}}^{13.6 \ 112}$
1.64329	$n_{\text{He}}^{13.6 \ 110}$
1.62067	$n_{\text{H}\gamma}^{99.2 \ 110}$
1.65852	$n_{\text{H}\gamma}^{21.6 \ 109}$
1.65852	$n_{\text{H}\gamma}^{21.3 \ 109}$
1.66024	$n_{\text{H}\gamma}^{18.2 \ 112}$
1.66106	$n_{\text{H}\gamma}^{16.8 \ 112}$
1.66372	$n_{\text{H}\gamma}^{13.6 \ 110}$
1.5800	$n_{\text{He}}^{100.2 \ 109}$
1.57990	$n_{\text{He}}^{100.1 \ 112}$
1.5801	$n_{\text{He}}^{100.0 \ 109}$
1.58027	$n_{\text{He}}^{100.0 \ 112}$
1.5803	$n_{\text{He}}^{99.5 \ 109}$
1.5802	$n_{\text{He}}^{99.4 \ 109}$
1.59095	$n_{\text{He}}^{78.3 \ 112}$
1.61527	$n_{\text{He}}^{24.7 \ 107}$
1.61589	$n_{\text{He}}^{24.0 \ 112}$
1.61593	$n_{\text{He}}^{23.9 \ 112}$
1.6162	$n_{\text{He}}^{23.3 \ 109}$
1.6165	$n_{\text{He}}^{22.6 \ 109}$
1.6168	$n_{\text{He}}^{21.6 \ 109}$
1.6168	$n_{\text{He}}^{21.3 \ 109}$
1.6172	$n_{\text{He}}^{20.9 \ 109}$
1.6172	$n_{\text{He}}^{20.6 \ 109}$
1.6174	$n_{\text{He}}^{20.5 \ 109}$
1.61738	$n_{\text{He}}^{20.0 \ 112}$
1.61757	$n_{\text{He}}^{19.8 \ 111}$
1.6176	$n_{\text{He}}^{19.8 \ 109}$
1.61747	$n_{\text{He}}^{19.7 \ 112}$
1.61782	$n_{\text{He}}^{19.7 \ 114}$
1.61770	$n_{\text{He}}^{19.3 \ 112}$
1.61774	$n_{\text{He}}^{19.2 \ 112}$
1.61818	$n_{\text{He}}^{18.9 \ 112}$
1.61836	$n_{\text{He}}^{18.2 \ 112}$

1.61837	$n_{\text{He}}^{18.2 \ 112}$
1.61844	$n_{\text{He}}^{18.2 \ 109}$
1.6188	$n_{\text{He}}^{17.8 \ 109}$
1.61862	$n_{\text{He}}^{17.6 \ 112}$
1.61844	$n_{\text{He}}^{17.2 \ 112}$
1.61898	$n_{\text{He}}^{17.0 \ 111}$
1.61879	$n_{\text{He}}^{16.9 \ 112}$
1.61907	$n_{\text{He}}^{16.8 \ 112}$
1.61888	$n_{\text{He}}^{16.7 \ 112}$
1.61972	$n_{\text{He}}^{15.0 \ 112}$
1.61976	$n_{\text{He}}^{14.9 \ 112}$
1.61985	$n_{\text{He}}^{14.4 \ 112}$
1.62038	$n_{\text{He}}^{13.6 \ 112}$

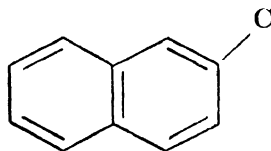
Additional Data

$$dD/dt = -0.0007437/^{\circ}\text{C}$$

(0 to 50°C)

(a) This constant was given as a freezing point in the literature.

2-Methylnaphthalene



M. P., °C

34.4 ₄
36.6–37.2 ³⁵
37 ^{27, 36}
35.5 ⁴⁰
35.1 ¹¹⁶
35 ^{38, 76}
34.5 ^{25, 54, 71}
34.44 ± 0.01 (a) ⁶¹
34.1 ^{43, 75}
34 ^{23, 65}
32.5–33 ⁶⁶
32–33 ^{73, 106}
32.5 ^{56, 96, 98, 115, 119}
31.5–32.5 ¹¹⁰
32 (b)

B. P., °C @ 760mm

241.1₄241–243⁷⁴242⁶241–242^{29, 98, 115}240–242^{5, 74}241.14¹⁹241.14 ± 0.05⁶¹241.1⁸⁰240–241¹²¹

240–242

241–242

148.07 ± 0.05

147

110–112

110.2–111.4

770⁶⁹759¹¹⁹57.78⁶¹50³³16³13³⁵ D_4^{20}

0.883

0.891

0.912

0.930

0.932

0.9491

0.961

0.9718

0.985

0.99045 ± 0.00002

0.9939

1.0043

174°⁹³170°³⁷142.5°⁹³120°³⁷111.7°⁹³99.4°¹¹⁰80°³⁷70°²⁵50°³⁷40°⁶¹39.9°¹¹⁰22°⁷⁸ n_D^{20} 1.528₆

1.551

1.569₆

1.5750

1.57426

1.586₄

1.5864

1.5965

1.599₇

1.5997

1.6015

1.60192 ± 0.00010

1.6028

1.60263

174°⁹³142.5°⁹³111.7°⁹³99.8°⁹⁴99.4°¹¹⁰78.5°⁹³78.3°⁹⁴50°²⁵49°⁹³48.8°⁹⁴40°²⁵40°⁶¹40°¹¹⁶39.9°¹¹⁰1.605₆

1.6056

1.56724

1.59407 ± 0.00010

1.59499

1.59454

1.62306 ± 0.00010

1.62395

1.64284

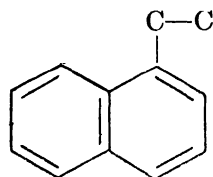
34°⁹³33.8°⁹⁴ $n_{H\alpha}^{99.4\ 110}$ $n_{H\alpha}^{40\ 61}$ $n_{H\alpha}^{39.9\ 110}$ $n_{H\alpha}^{99.4\ 110}$ $n_{H\beta}^{40\ 61}$ $n_{H\beta}^{39.9\ 110}$ $n_{H\beta}^{39.9\ 110}$ $n_{H\gamma}^{39.9\ 110}$

(a) This constant was given as a freezing point in the literature.

(b) The melting point 32 is found in references 5, 15, 16, 63, 97, 103, 118.

C₁₂H₁₂

1-Ethynaphthalene



B. P., °C @ 760mm

258–259⁴⁵257–259¹²⁰256–259³²

257–259.5

256.5

247–249

112–116

100

757.7¹²756⁵⁹742³³9³¹2–3¹² D_4^{20} 1.0123³¹

1.0111

1.0123

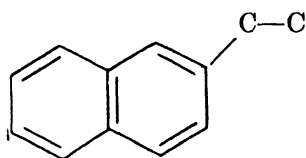
1.0204

1.0221

14.2°⁵⁹ $D_0^{11.9\ 12}$ $D_0^0\ 12$ $D_0^0\ 59$ n_D^{20} 1.6075³¹

1.6089

14.2°⁵⁹

2-Ethynaphthalene

M. P., °C

-7---6.5⁵⁷-7.5⁵⁸

B. P., °C @ 760mm

251.5

252^{52, 53}251-252^{28, 114}250-252¹⁴251^{45, 62}250-251⁹249-254 750⁸¹248 725⁹173-175 50⁹⁷122-125 14²⁶117-120 12¹¹⁴117-118 10³ D_4^{20}

0.9958 15° 57, 58

1.0015 $D_0^{25, 72}$

1.0078 0° 62

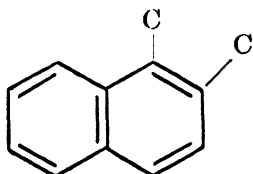
1.0069 $D_0^{0, 57, 58}$ n_D^{20}

1.591 25° 72

1.6028 15° 57, 58

(a)

(a) Refractive indices at other lines are found in reference 57.

1,2-Dimethylnaphthalene

M. P., °C

-3.5²²

B. P., °C @ 760mm

266-267⁵¹265 770²²265-266 752⁵¹264 749³⁰144 22¹¹⁰148-149 18⁹⁵139-140 15⁹⁵135-136 14⁴²137 13⁶⁴131.5 12³⁰120 0.02⁸² D_4^{20} 1.011⁶⁴1.015⁵¹1.019³⁰

1.0118 19.0° 64

1.025 16.6° 95

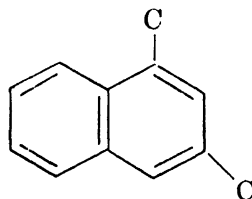
1.0219 16.35° 110

 n_D^{20} 1.6135⁵¹1.6142⁶⁴

1.61461

1.61795 19° 64

1.60691 16.35° 110

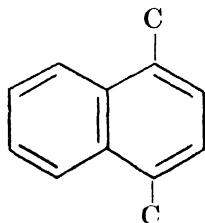
1.61014 $n_{H\alpha}^{19, 64}$ 1.63613 $n_{H\alpha}^{16, 35, 110}$ 1.63945 $n_{H\beta}^{19, 64}$ 1.65976 $n_{H\beta}^{16, 35, 110}$ $n_{H\gamma}^{16, 35, 110}$ **1,3-Dimethylnaphthalene**

B. P., °C @ 760mm

248-250⁴¹262-264 746¹⁰²124-126 10⁴¹107 1⁴

D_4^{20}	1.01997	15° 41
n_D^{20}	1.6130	15° 41

1,4-Dimethylnaphthalene



M. P., °C

15-17^{102, 105}5.5-6.5⁷⁹

B. P., °C @ 760mm

264-266⁶⁶265⁶⁸264⁴

262-264

751¹¹

262.5-263

742¹⁰

145

40⁶⁸

118

107⁹

110

6³⁴ D_4^{20}

1.0157

1.0157³⁴

0.97411

77.7° 68

1.01058

27.7° 68

1.0106

27.7° 7, 8

1.0176

 D_{20}^{20} 34

1.01803

16.4° 68

1.0199

12° 11

1.0283

0° 11

 n_D^{20}

1.58656

77.7° 68

1.61052

27.7° 68

1.61567

16.4° 68

1.57901

 $n_{H\alpha}^{77.7}$ 68

1.60250

 $n_{H\alpha}^{27.7}$ 68

1.6025

 $n_{H\alpha}^{27.7}$ 8

1.60765

 $n_{H\alpha}^{16.4}$ 68

1.60710

 $n_{H\beta}^{77.7}$ 68

1.62200

 $n_{H\beta}^{27.7}$ 68

1.63722

 $n_{H\beta}^{16.4}$ 68

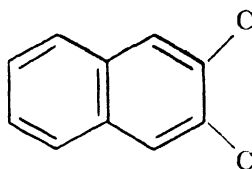
1.65117

 $n_{H\gamma}^{27.7}$ 68

Additional Data

 $dD/dt = -0.00072025/^\circ\text{C}$
 (0 to 78°C)

2,3-Dimethylnaphthalene



M. P., °C

104

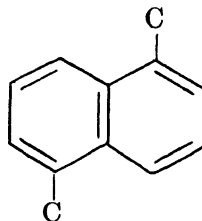
104-105¹¹⁷104-104.5⁹⁶104^{4, 122}102¹⁰⁰

B. P., °C @ 760mm

265-266

767⁴⁸

1,5-Dimethylnaphthalene



M. P., °C

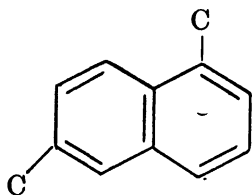
82^{49, 50}80-80.5¹77-78¹⁰⁴

B. P., °C @ 760mm

265.5⁴⁹

265-265.5

761⁵⁰

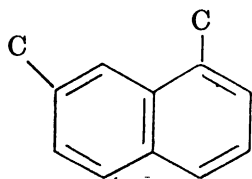
1,6-Dimethylnaphthalene

M. P., °C
97⁹⁹

B. P., °C @ 760mm
262–264⁶⁹
262–263^{47, 118}
262.5¹³

D_4^{20}
1.0049 16.3°¹¹⁰
1.0056 15°¹¹⁸

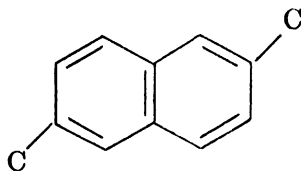
n_D^{20}
1.60886 16.3°¹¹⁰
1.60119 $n_{H\alpha}^{16.3}$ ¹¹⁰
1.63021 $n_{H\beta}^{16.3}$ ¹¹⁰
1.64958 $n_{H\gamma}^{16.3}$ ¹¹⁰

1,7-Dimethylnaphthalene

M. P., °C
84–85¹⁰¹

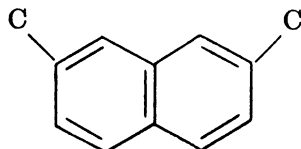
B. P., °C @ 760mm
261–262⁶²
258⁴
147–149 15²¹

D_4^{20}
1.0115⁶²
 n_D^{20}
1.60831⁶²

2,6-Dimethylnaphthalene

M. P., °C
110.5
113⁶⁹
111¹⁷
110–111^{17, 44, 63, 113, 118}
110.5⁴⁰
110^{13, 23, 53}
109⁸⁸

B. P., °C @ 760mm
261–263⁴⁴
261–262⁶⁹
260–261 767⁴⁸
261–262 762¹¹⁸

2,7-Dimethylnaphthalene

M. P., °C
97
98.5⁸³
98⁸⁶
97–98⁹⁰
96.5–97.5⁷⁰
97^{46, 83, 89, 97}
96–97^{83, 91, 92, 118}
96.5²⁴
96^{23, 84}
94–95⁸⁷
94^{69, 85}

B. P., °C @ 760mm
265¹⁸
262 758¹¹⁸
128–130 12⁸⁵

*References on C₁₁H₁₀ through C₁₂H₁₂
Compounds*

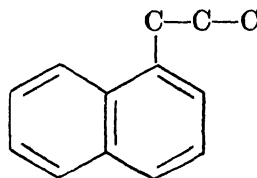
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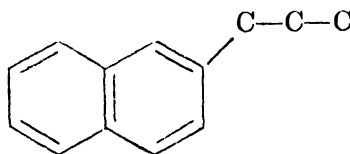


1-*n*-Propylnaphthalene



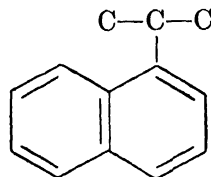
B. P., °C @ 760mm
 275-276⁶¹
 274-275^{4, 5}

2-*n*-Propylnaphthalene



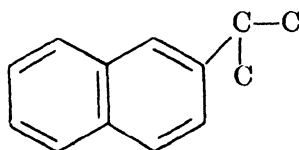
B. P., °C @ 760mm
 277-279^{4, 5}

1-Isopropylnaphthalene



B. P., °C @ 760mm	
264-266 ⁹	
263-264	769 ²²
132	12 ²²
132-134	10 ^{38, 39}
<i>D</i> ₄ ²⁰	
0.90075	15° ³⁸
<i>n</i> _D ²⁰	
1.5728	15° ³⁹
1.5775	15° ³⁸

2-Isopropylnaphthalene



B. P., °C @ 760mm

268⁸⁶263–265²²262⁸⁶

265

755⁶²

145

25⁶²

129–130

14²

125

12⁶⁵

99–100

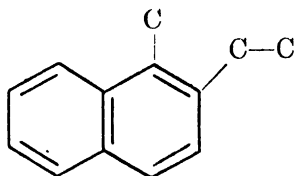
0.2⁸ D_4^{20} 0.9795⁸⁶

0.974

 D_{25}^{25} 59

0.990

0° 62

 n_D^{20} 1.5772⁸⁶1.5775⁵⁹1.5784⁸⁶**1-Methyl-2-ethylnaphthalene**

B. P., °C @ 760mm

137.5–140

12⁴⁵

140–145

11¹⁵ D_4^{20}

1.0014

15.4° 45

 n_D^{20} 1.599⁴⁵

1.60138

15.4° 45

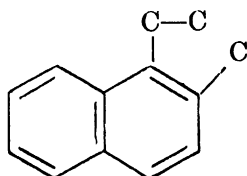
1.59422

 $n_{H\alpha}^{15.4}$ 45

1.62151

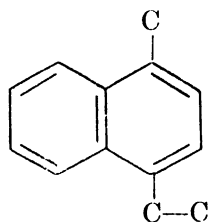
 $n_{H\beta}^{15.4}$ 45

1.63995

 $n_{H\gamma}^{15.4}$ 45**1-Ethyl-2-methylnaphthalene**

B. P., °C @ 760mm

135–145

11¹⁵**1-Methyl-4-ethylnaphthalene**

B. P., °C @ 760mm

122

40³⁰

138–140

12⁴⁵ D_4^{20}

1.0086

13.1° 45

 n_D^{20}

1.60571

13.1° 45

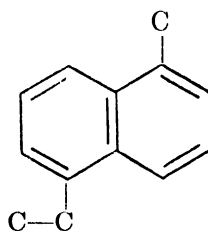
1.59839

 $n_{H\alpha}^{13.1}$ 45

1.62624

 $n_{H\beta}^{13.1}$ 45

1.64490

 $n_{H\gamma}^{13.1}$ 45**1-Methyl-5-ethylnaphthalene**

M. P., °C

40³⁶

B. P., °C @ 760mm

140

12⁷⁷

133

10³⁶ D_4^{20}

1.011

18° 77

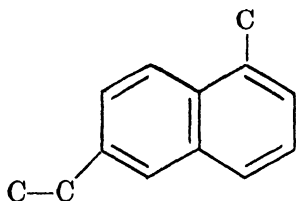
 n_D^{20}

1.600

30° 36

1.6082

18° 77

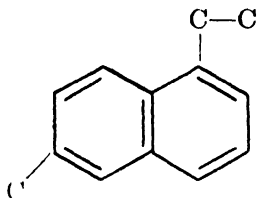
1-Methyl-6-ethylnaphthalene

B. P., °C @ 760mm

146

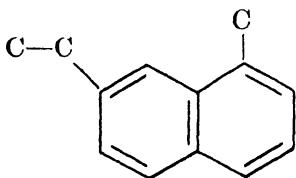
14⁵⁸

140

12³⁶ n_D^{20} 1.598³⁶**1-Ethyl-6-methylnaphthalene**

B. P., °C @ 760mm

135-138

12¹⁴**1-Methyl-7-ethylnaphthalene**

M. P., °C

96-97²⁰

B. P., °C @ 760mm

133-138

16⁵²

130-135

16⁸⁴

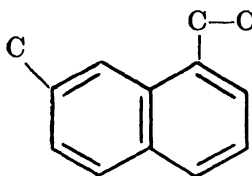
134.5-136

12⁷⁹

134-136

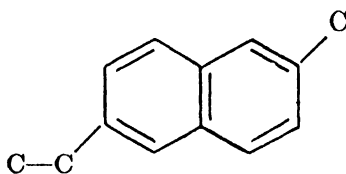
12⁷⁹

133

12³⁶ n_D^{20} 1.5970³⁶**1-Ethyl-7-methylnaphthalene**

B. P., °C @ 760mm

128

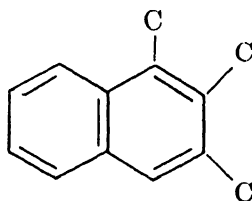
11¹⁴**2-Methyl-6-ethylnaphthalene**

M. P., °C

44-45⁴⁴

B. P., °C @ 760mm

145-150

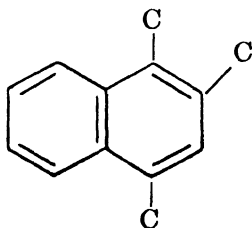
11¹⁶**1,2,3-Trimethylnaphthalene**

M. P., °C

27-28⁴⁰

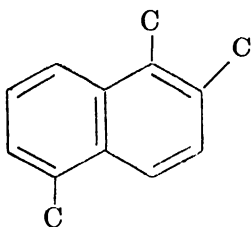
B. P., °C @ 760mm

125-130

12⁶⁶**1,2,4-Trimethylnaphthalene**

B. P., °C @ 760mm

146

12⁶⁶**1,2,5-Trimethylnaphthalene**

M. P., °C

31–32⁶⁹–5³⁴

B. P., °C @ 760mm

148–149

16⁷⁰

147–148

16⁷⁰

147–148

11⁶⁹

101–103

1.5³⁴

113–115

0.5⁴¹

120

0.2⁸⁰ D_4^{20}

1.0103

22° 69

1.008

15° 70

1.011

15° 70

 n_D^{20}

1.6093

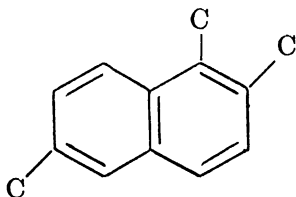
22° 69

1.6092

15° 70

1.6093

15° 70

1,2,6-Trimethylnaphthalene

M. P., °C

14⁸⁷

B. P., °C @ 760mm

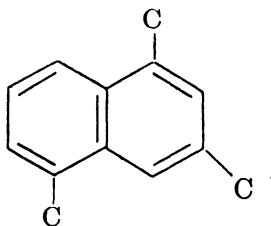
154–156

15⁸⁹

146

10⁶⁶

119–123

10⁷⁶ D_4^{20} 0.935⁷⁶ n_D^{20} 1.521⁷⁶**1,3,5-Trimethylnaphthalene**

M. P., °C

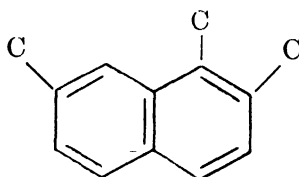
47⁸⁷43⁶⁶

B. P., °C @ 760mm

139.5

10⁶⁶**1,2,7-Trimethylnaphthalene**

(Sapotalene)



B. P., °C @ 760mm

160–163

16¹⁷

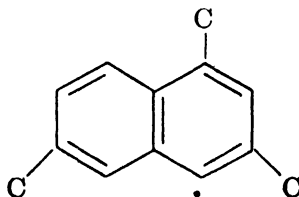
143

13⁶⁶

140–145

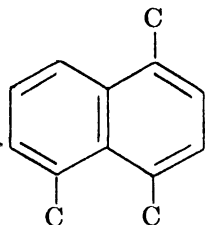
12⁵³

133

10¹⁸**1,3,6-Trimethylnaphthalene**

B. P., °C @ 760mm
140-144 10⁶⁶

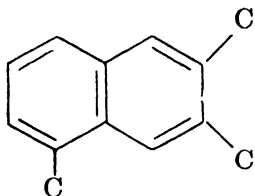
1,4,5-Trimethylnaphthalene



M. P., °C
63^{7, 66}

B. P., °C @ 760mm
145 12⁶⁶

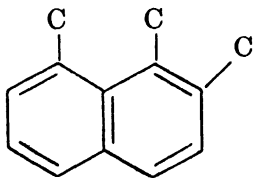
2,3,5-Trimethylnaphthalene



M. P., °C
28^{7, 81}
25.3⁴⁷

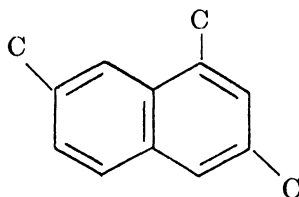
B. P., °C @ 760mm
285⁴⁷
138 12⁶⁶

1,2,8-Trimethylnaphthalene



B. P., °C @ 760mm
150 16⁶⁶

1,3,7-Trimethylnaphthalene



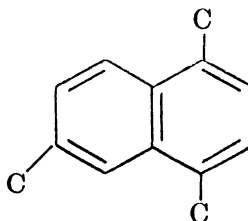
M. P., °C
13.5^{46, 48}

B. P., °C @ 760mm
280 764⁴⁸
131-133 9⁶⁶

D_4^{20}
1.007⁴⁶
0.9801 21°⁶⁶

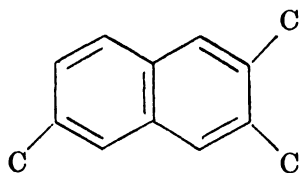
n_D^{20}
1.57589¹⁶
1.5972 15.5°⁶⁶

1,4,6-Trimethylnaphthalene



B. P., °C @ 760mm
140-142 15⁶⁶

2,3,6-Trimethylnaphthalene



M. P., °C
102^{34, 46, 48}
92-93^{21, 23}

B. P., °C @ 760mm

286⁴⁸263–264²¹

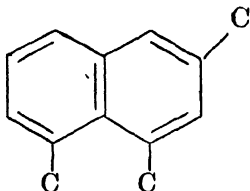
286

762⁴⁶

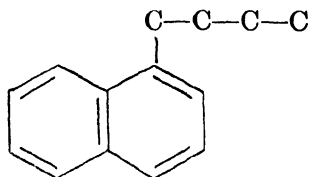
146–148

14⁶⁶

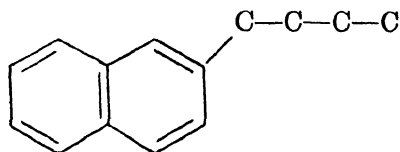
104–105

1.5³⁴**2,4,5-Trimethylnaphthalene**

M. P., °C

48³⁷ $C_{14}H_{16}$ **1-*n*-Butylnaphthalene**

B. P., °C @ 760mm

281–283^{4, 5}**2-*n*-Butylnaphthalene**

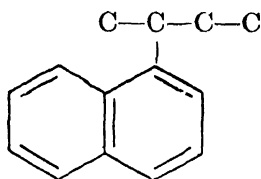
B. P., °C @ 760mm

283–285^{4, 5}

282.5–283.5

745⁶⁶

125–130

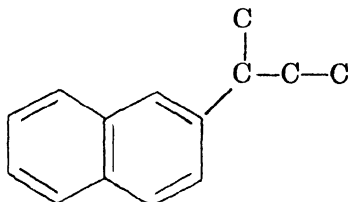
13⁶⁰ D_4^{20} 0.9659⁶⁶ n_D^{20} 1.5790⁶⁶**1-*sec*-Butylnaphthalene**

B. P., °C @ 760mm

111–113

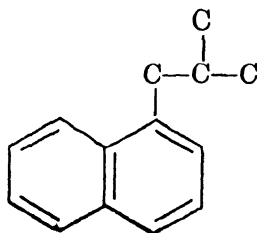
2⁸⁶

105–107

2⁸⁶ D_4^{20} 0.9746⁶⁶0.9749⁶⁶ n_D^{20} 1.5698⁶⁶**2-*sec*-Butylnaphthalene**

B. P., °C @ 760mm

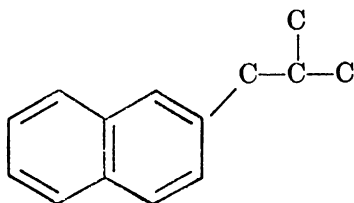
147–148

33⁸ n_D^{20} 1.5814⁸**1-Isobutylnaphthalene**

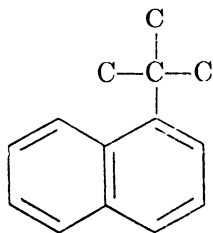
B. P., °C @ 760mm

136–138

11²⁷

2-Isobutyl-naphthalene

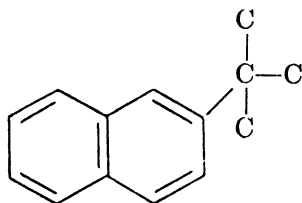
B. P., °C @ 760mm
112-113 6²⁷

1-tert-Butyl-naphthalene

B. P., °C @ 760mm
287-289⁸⁶
114-118 3⁴⁹

D_4^{20}
0.9629⁸⁶

n_D^{20}
1.5726⁸⁶

2-tert-Butyl-naphthalene

M. P., °C
-4⁹⁰

B. P., °C @ 760mm
274-276⁸⁶
274-277 756¹³
272-275 745⁸⁶
137-139 17¹³
145 15⁹⁰

142-143	14 ⁸³
140-145	13 ⁵⁹
127-131	9 ³²
115	6 ⁹⁰
125	4 ¹³

D_4^{20}

0.9674⁸⁶

0.9687⁸⁶

0.979

D_{25}^{25} ⁵⁹

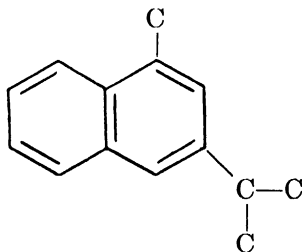
n_D^{20}

1.5685⁵⁹

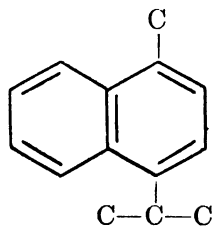
1.5768⁸⁶

1.5795⁹⁰

1.5812⁸⁶

1-Methyl-3-isopropyl-naphthalene

B. P., °C @ 760mm
150 11²⁶

1-Methyl-4-isopropyl-naphthalene

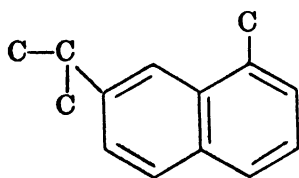
M. P., °C
196³⁰

B. P., °C @ 760mm

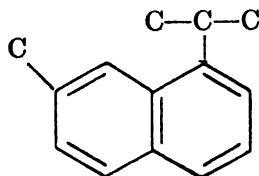
148 16⁸

145-148 12⁶⁰

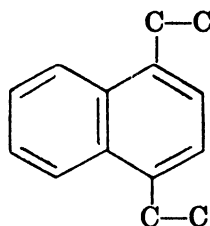
D_4^{20}	0.9934	14.5° ⁶⁰
n_D^{20}	1.5907	14.5° ⁶⁰

1-Methyl-7-isopropylnaphthalene
(Eudalene)


B. P., °C @ 760mm

281⁷280–281 730⁶⁴280–281 720⁷¹152 18⁸⁴142–143 12⁷¹142 12⁷¹140 11⁷⁸ D_4^{20} 0.9734 17°⁷¹0.9737 17°⁷⁸0.9747 16°⁷¹ n_D^{20} 1.5847 17°⁷¹1.5849 17°⁷⁸1.5850 16°⁷¹
1-Isopropyl-7-methylnaphthalene
(Apocadalene)


B. P., °C @ 760mm

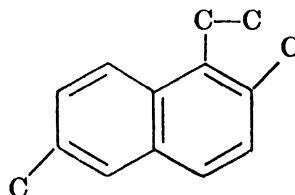
282⁷139–141 12⁷² D_4^{20} 0.9833⁷³ n_D^{20} 1.5884⁷³
1,4-Diethylnaphthalene


M. P., °C

16.5–17¹

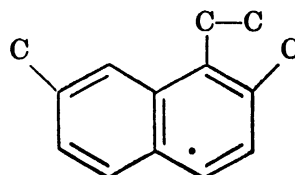
B. P., °C @ 760mm

165

25¹150–152.5 12⁴⁵136–139 9³² D_4^{20} 0.993³²0.9983 13.1°⁴⁵ n_D^{20} 1.601³²1.59699 13.1°⁴⁵1.59005 $n_{H\alpha}^{13.1\ 45}$ 1.61642 $n_{H\beta}^{13.1\ 45}$ 1.63423 $n_{H\gamma}^{13.1\ 45}$
1-Ethyl-2,6-dimethylnaphthalene


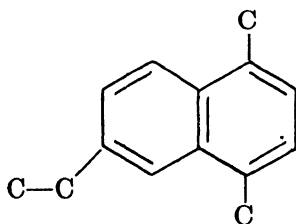
B. P., °C @ 760mm

162

23³¹
1-Ethyl-2,7-dimethylnaphthalene


B. P., °C @ 760mm

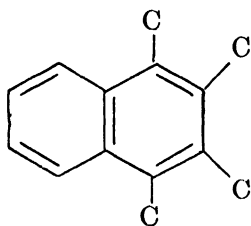
140–142

12⁶⁷**1,4-Dimethyl-6-ethylnaphthalene**

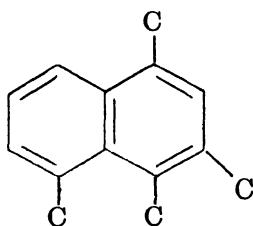
B. P., °C @ 760mm

298–302³⁸

115

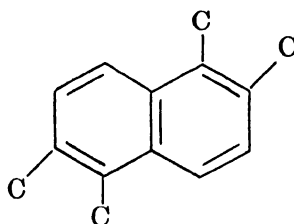
0.5⁶⁸**1,2,3,4-Tetramethylnaphthalene**

M. P., °C

107–108⁵⁷106.5–107.5¹⁰104–105¹²**1,3,4,5-Tetramethylnaphthalene**

B. P., °C @ 760mm

150

10⁶⁷**1,2,5,6-Tetramethylnaphthalene**

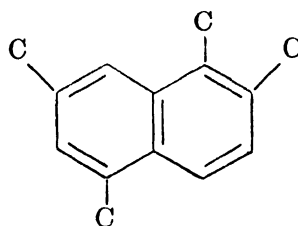
M. P., °C

116.4

118¹⁸116–117^{53, 74}116–116.5^{67, 74}116⁶³

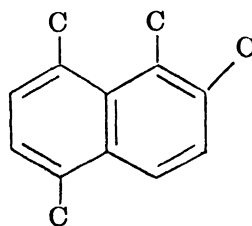
B. P., °C @ 760mm

150–155

12⁶⁷**1,2,5,7-Tetramethylnaphthalene**

B. P., °C @ 760mm

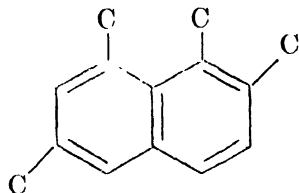
155–158

12⁴²**1,2,5,8-Tetramethylnaphthalene**

B. P., °C @ 760mm

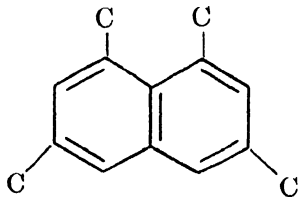
150

9⁶⁷

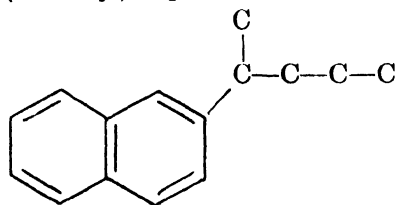
1,2,6,8-Tetramethylnaphthalene

B. P., °C @ 760mm

166-168

15⁶⁷**1,3,6,8-Tetramethylnaphthalene**

M. P., °C

84-85⁸⁵ $C_{15}H_{18}$ **2-(2'-Pentyl)-naphthalene**

B. P., °C @ 760mm

130-131

5⁴⁹**1-Isopentylnaphthalene (a)**

B. P., °C @ 760mm

287-289⁴⁹

(a) The structure of this compound was not clearly defined in the literature.

2-Isopentylnaphthalene (a)

M. P., °C

108-110⁶⁴

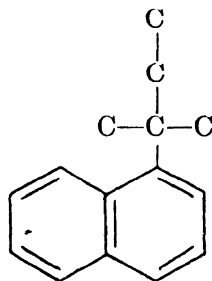
B. P., °C @ 760mm

289-292⁵⁴

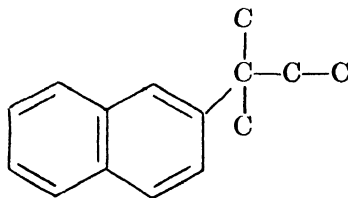
140

12⁸²

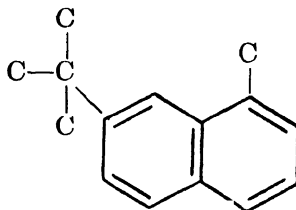
(a) The structure of this compound was not clearly defined in the literature.

1-tert-Pentylnaphthalene

B. P., °C @ 760mm

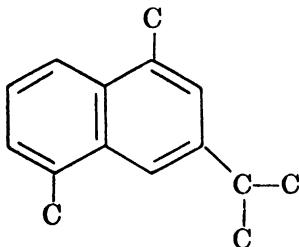
301-303⁸⁶ D_4^{20} 0.9751⁸⁶**2-tert-Pentylnaphthalene**

B. P., °C @ 760mm

287-290⁸⁶ D_4^{20} 0.9751⁸⁶ n_D^{20} 1.5772⁸⁶**1-Methyl-7-tert-butyl-naphthalene**

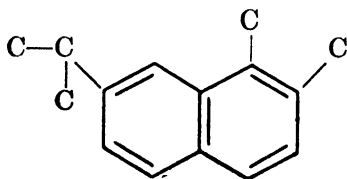
B. P., °C @ 760mm

151-152

14²⁵**1,5-Dimethyl-3-isopropylnaphthalene**

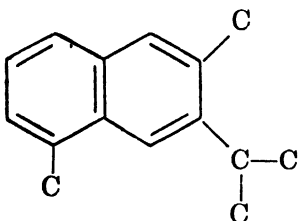
B. P., °C @ 760mm

110-112

0.8⁷³**1,2-Dimethyl-7-isopropylnaphthalene**

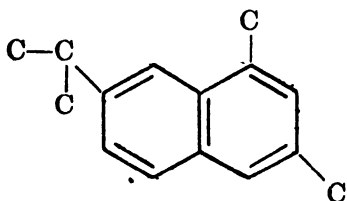
B. P., °C @ 760mm

149-151

9¹⁰**2,5-Dimethyl-3-isopropylnaphthalene**

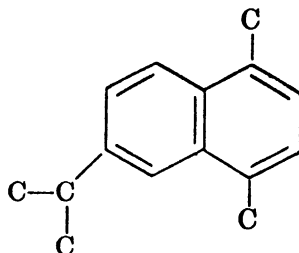
B. P., °C @ 760mm

154-158

13¹⁰**1,3-Dimethyl-7-isopropylnaphthalene**

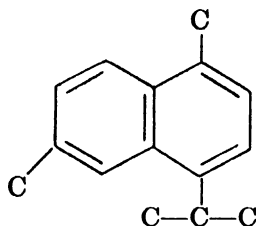
B. P., °C @ 760mm

165-167

19¹¹**1,4-Dimethyl-6-isopropylnaphthalene**

B. P., °C @ 760mm

155-157

12⁷³**1,6-Dimethyl-4-isopropylnaphthalene
(Cadalene)**

B. P., °C @ 760mm

287-291⁴³

291-292

730⁶⁴

165

20⁶¹

159.5-164

15²⁸

159-163

15²⁸

157

15⁷¹

153-154

15⁶

154-159

13²⁹

155-157

12⁶⁵

155-156

11⁷⁶

149

10³ D_4^{20} 0.9731⁵⁵

0.9716

25°⁵¹

0.9781

19°²⁸

0.9790

19°²⁸

0.9798

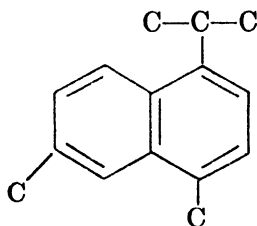
19°⁸⁸

0.9824

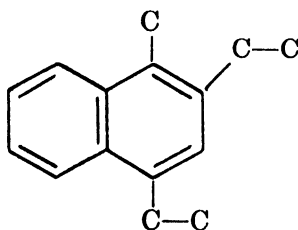
15°⁶⁴

n_D^{20}

1.5820 ⁴³	
1.5834 ⁷¹	
1.58491	25° ⁵¹
1.582	19° ⁷⁵
1.5850	19° ²⁸
1.5851	19° ²⁸
1.5858	15° ⁸⁸
1.5869	15° ⁶⁴

1-Isopropyl-4,6-dimethylnaphthalene

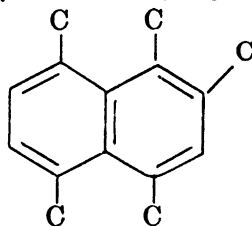
M. P., °C
60⁶⁰

1-Methyl-2,4-diethylnaphthalene D_4^{20}

0.9870 13.3°⁴⁵

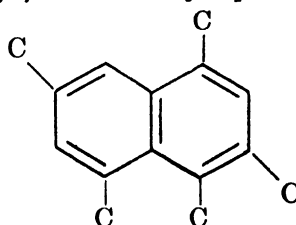
 n_D^{20}

1.59231	13.3° ⁴⁵
1.58549	$n_{H\alpha}^{13.3\ 45}$
1.61135	$n_{H\beta}^{13.3\ 45}$
1.62870	$n_{H\gamma}^{13.3\ 45}$

1,2,4,5,8-Pentamethylnaphthalene

B. P., °C @ 760mm

150

10⁶⁷**1,3,4,5,7-Pentamethylnaphthalene**

M. P., °C

106–107⁶⁷

B. P., °C @ 760mm

150

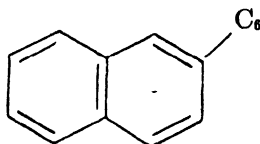
10⁶⁷

*References on C₁₁H₁₄ through C₁₁H₁₈
Compounds*

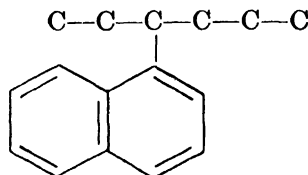
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**2-Hexylnaphthalene**

D_4^{20}	0.9575	25° ¹¹
n_D^{20}	1.5673	25° ¹¹

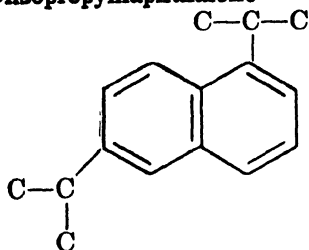
1-(3'-Hexyl)-naphthalene

B. P., °C @ 760mm	148-158	1 ¹⁸
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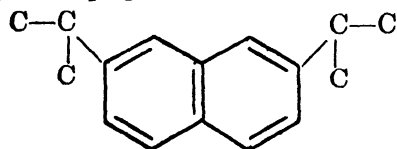
x-Methyl-x-isopentyl-naphthalene (a)

B. P., °C @ 760mm	170-172	15 ⁸
D_4^{20}	0.9607	21.5° ⁸

(a) The structure of this compound was not clearly defined in the literature.

1,6-Diisopropylnaphthalene

M. P., °C
52¹⁰

2,7-Diisopropylnaphthalene

B. P., °C @ 760mm
278–280²⁰

D_4^{20}
0.9683²⁰

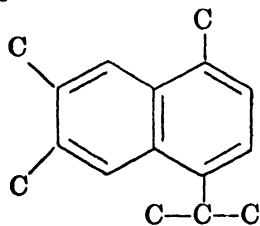
n_D^{20}
1.5701²⁰

x,x-Diisopropylnaphthalene (a)

M. P., °C
38¹⁰

B. P., °C @ 760mm
317–319¹⁰

(a) The structure of this compound was not clearly defined in the literature.

1,6,7-Trimethyl-4-isopropylnaphthalene

M. P., °C
39.5–40.0³

C₁₇H₂₂**2-(x'-Naphthyl)-heptane (a)**

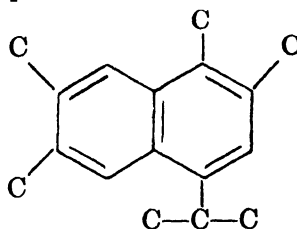
B. P., °C @ 760mm

162–165 6¹⁹

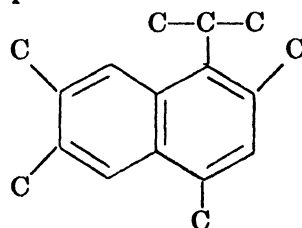
D_4^{20} 0.933 26.5°¹⁹

n_D^{20} 1.5448 24.4°¹⁹

(a) The structure of this compound was not clearly defined in the literature.

1,2,6,7-Tetramethyl-4-isopropylnaphthalene

M. P., °C
102–103³

1-Isopropyl-2,4,6,7-tetramethylnaphthalene

M. P., °C
96.5–97³

x₄-Tetramethyl-x-isopropylnaphthalene (a)

M. P., °C
111³

(a) The structure of this compound was not clearly defined in the literature.

$C_{18}H_{24}$ **x-n-Octylnaphthalene (a)**

B. P., °C @ 760mm

335-337 750¹⁴ D_4^{20} 0.9366¹⁴ n_D^{20} 1.5510¹⁴

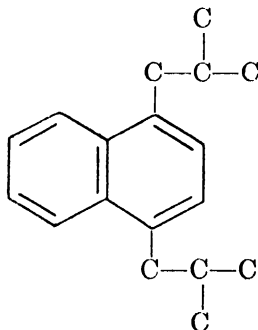
(a) The structure of this compound was not clearly defined in the literature.

x,x-Di-sec-butylnaphthalene (a)

B. P., °C @ 760mm

144-145 2²⁰140-141 2²⁰ D_4^{20} 0.9529²⁰0.9547²⁰ n_D^{20} 1.5596²⁰1.5601²⁰

(a) The structure of this compound was not clearly defined in the literature.

1,4-Diisobutylnaphthalene D_4^{20}

0.9310

0.933¹⁶0.8784 100°⁴0.9104 50°⁴0.9424 0°⁹ n_D^{20}

1.5380

25°¹⁶

1.5410

19°⁹

Additional Data

 $dD/dt = -0.0006561/°C$

(0 to 100°C)

x,x-Di-tert-butylnaphthalene (a)

M. P., °C

148 (b)¹⁷146-147^{1, 6}145-146 (b)⁷143²142¹⁰132²⁰82-83 (b)⁷80-81 (b)¹⁷

B. P., °C @ 760mm

320 (b)⁷319 (b)⁷

180-185

13¹⁵

(a) The structure of this compound was not clearly defined in the literature.

(b) These constants were determined on isomeric forms.

 $C_{19}H_{26}$ **x,x,x-Triisopropylnaphthalene (a)**

B. P., °C @ 760mm

265-270¹⁵

148-152

2²⁰ D_4^{20} 0.9591²⁰

0.946

 $D_{25}^{25, 15}$ n_D^{20} 1.5566¹⁵1.5605²⁰

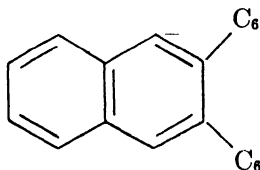
(a) The structure of this compound was not clearly defined in the literature.

C₂₀H₂₈**x,x-Di-*tert*-pentylnaphthalene (a)**

M. P., °C

154–155²⁰

(a) The structure of this compound was not clearly defined in the literature.

C₂₂H₃₂**2,3-Dihexylnaphthalene** n_D^{20}

1.5434

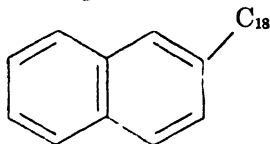
25° 11

x₄-Tetraisopropylnaphthalene (a)

M. P., °C

128²127¹⁰

(a) The structure of this compound was not clearly defined in the literature.

C₂₈H₄₄**2-Octadecylnaphthalene**

M. P., °C

51–52¹¹ D_4^{20}

0.906

25° 11

0.912

 $D_{15.6}^{15.6\ 13}$ n_D^{20}

1.5206 (a)

25° 11

(a) This constant is an extrapolated value.

x,x,x-Trihexylnaphthalene (a) D_4^{20}

0.908

25° 11

0.911

25° 11

0.914

 $D_{15.6}^{15.6\ 13}$

0.917

 $D_{15.6}^{15.6\ 13}$ n_D^{20}

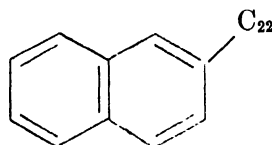
1.5276

25° 11

1.5297

25° 11

(a) The structure of this compound was not clearly defined in the literature.

C₃₂H₆₂**2-Docosylnaphthalene**

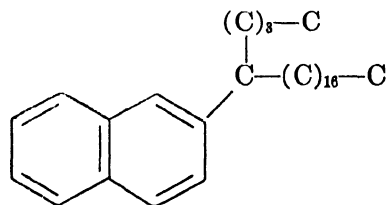
M. P., °C

59.77¹³56–58¹¹ D_4^{20}

0.8987

25° 11

0.905

 $D_{15.6}^{15.6\ 13}$ **5-(2'-Naphthyl)-docosane**

M. P., °C

38¹²

B. P., °C @ 760mm

200–201

2¹² D_4^{20}

0.898 (a)

25° 11

0.904

 $D_{15.6}^{15.6\ 13}$

n_D^{20}

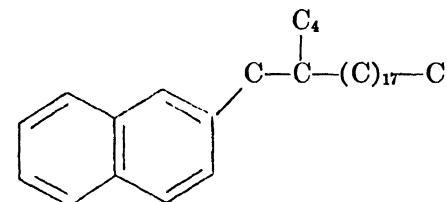
1.5170

 $25^\circ 11$

(a) This constant is an extrapolated value.

 $C_{34}H_{68}$

1-(2'-Naphthyl)-2-butyleicosane

 D_4^{20}

0.9011

 $25^\circ 11$

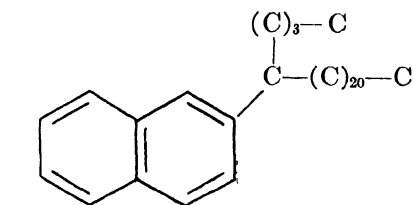
0.907

 $D_{15.6}^{15.6 \ 13}$ n_D^{20}

1.5163

 $25^\circ 11$ $C_{36}H_{70}$

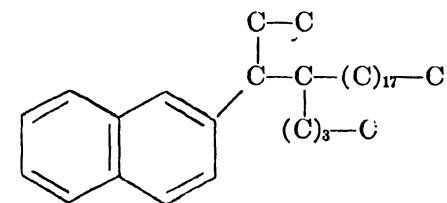
5-(2'-Naphthyl)-hexacosane

M. P., $^\circ C$ 39¹³ D_4^{20}

0.885

 $D_{15.6}^{15.6 \ 13}$

3-(2'-Naphthyl)-4-n-butylidocosane

 D_4^{20}

0.8890

 $25^\circ 11$

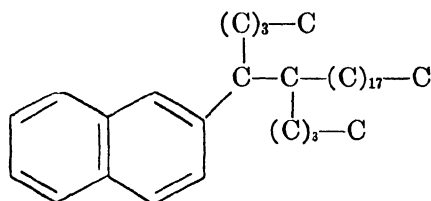
0.895

 $D_{15.6}^{15.6 \ 13}$ n_D^{20}

1.5090

 $25^\circ 11$ $C_{38}H_{74}$

5-(2'-Naphthyl)-6-n-butyltetracosane

 D_4^{20}

0.8918

 $25^\circ 11$

0.898

 $D_{15.6}^{15.6 \ 13}$ n_D^{20}

1.5093

 $25^\circ 11$ References on $C_{16}H_{34}$ through $C_{38}H_{74}$
Compounds

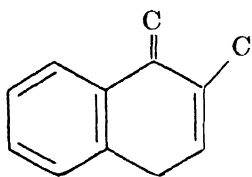
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3. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-12}



1-Methylene-2-methyl-1,4-dihydronaphthalene

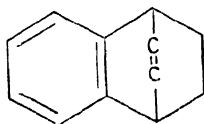


B. P., °C @ 760mm

157

15¹⁷

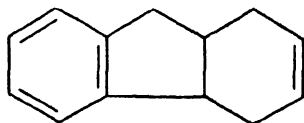
1,4-Endoethene-1,2,3,4-tetrahydronaphthalene



M. P., °C

63.5³²

1,4,4a,9a-Tetrahydrofluorene



B. P., °C @ 760mm

121

12⁴⁹

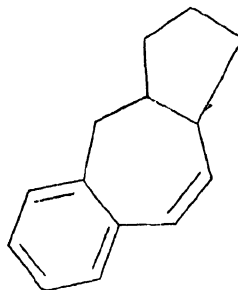
116-118

11²D₄²⁰

1.018

15° ⁴⁹ n_D^{20} 1.58924⁴⁹

1,2-Cyclopentano-5,6-benzocycloheptene-3



M. P., °C

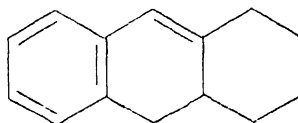
29-35¹⁶

B. P., °C @ 760mm

130-135

1¹⁶

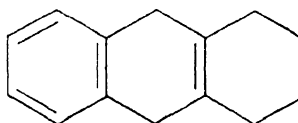
1,2,3,4,4a,10-Hexahydroanthracene



M. P., °C

63-66¹⁶

1,2,3,4,9,10-Hexahydroanthracene



M. P., °C

66.5^{23, 24, 25, 46}63³⁸62–63³⁶60–62⁹

B. P., °C @ 760mm

303–306^{23, 24, 25}**x₆-Hexahydroanthracene (a)**

M. P., °C

78⁵⁰70⁵⁴63²⁶

B. P., °C @ 760mm

290²⁶

(a) The structure of this compound was not clearly defined in the literature.

x₆-Hexahydrophenanthrene (a)

M. P., °C

–3⁷

B. P., °C @ 760mm

305–307^{7, 8}

289–290

737⁴³

179–180

23¹⁹

165–167

13⁷

125–126

2.5¹³ D_4^{20} 1.045⁴³

1.043

15°⁷

1.053

0°⁷ n_D^{20} 1.5704⁴³

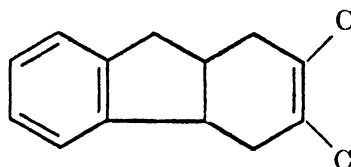
1.586

15°⁷

1.5810

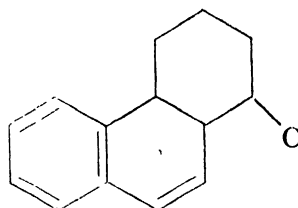
14.5°¹³

(a) The structure of this compound was not clearly defined in the literature.

 $C_{15}H_{18}$ **2,3-Dimethyl-1,4,4a,9a-tetrahydrofluorene**

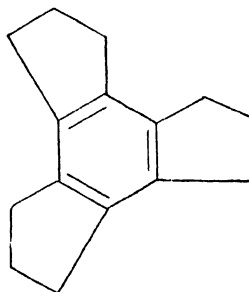
B. P., °C @ 760mm

146–148

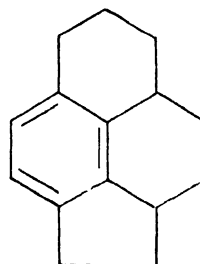
11²**1-Methyl-1,2,3,4,4a,10a-hexahydrophenanthrene**

B. P., °C @ 760mm

124

0.3²⁷**4,5,6,7-Dicyclopentanoindane**

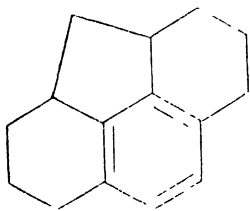
M. P., °C

97⁴¹**Cyclopentano-[gh]-3a,4,5,6-tetrahydrophenalan**

M. P., °C
29⁵⁸

B. P., °C @ 760mm
130-132 12⁵⁸

Cyclopentano-[def]-1,2,3,4,5,6,7,8-octahydrophenanthrene

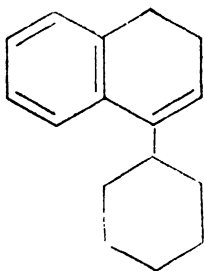


M. P., °C
47⁵⁸

B. P., °C @ 760mm
238⁵⁸
130-132 15⁵⁸



4-Cyclohexyl-1,2-dihydronaphthalene

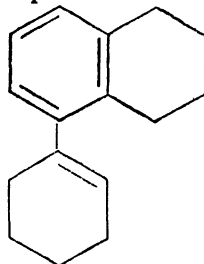


B. P., °C @ 760mm
172 10¹⁴
140 1¹⁴

D_4^{20} 1.021 12.2°¹⁴

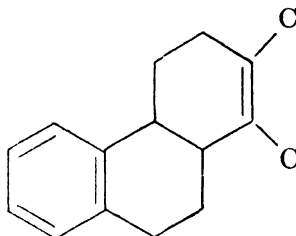
n_D^{20} 1.5762 12.2°¹⁴

5-(Cyclohexen-1'-yl)-1,2,3,4-tetrahydronaphthalene



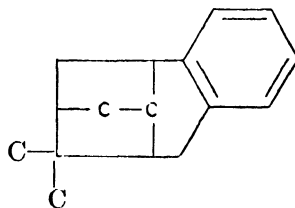
B. P., °C @ 760mm
181 15¹⁴

1,2-Dimethyl-3,4,4a,9,10,10a-hexahydrophenanthrene



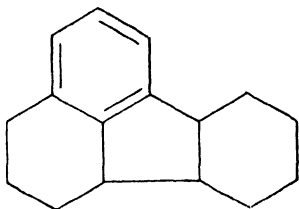
B. P., °C @ 760mm
105-107 0.02⁶

2,3-Benzo-6,6-dimethyltricyclo-[3,2,1,1',9]-decane (a)



B. P., °C @ 760mm
121.5-122.5 5³
110.5-111 0.3³
 D_4^{20} 1.0192 D_0^{16} 3
 n_D^{20} 1.5540 16°³

(a) The structure of this compound was not clearly defined in the literature.

Benzo-[jk]-1,2,3,4,4a,4b,5,6,7,9a-decahydrofluorene

B. P., °C @ 760mm

174-176

13⁵⁷

181-183

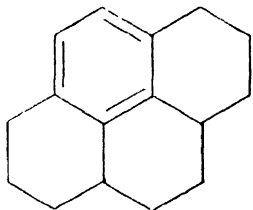
12⁵⁷ D_4^{20}

1.0207

29° 57

1.043

22° 57

1,2,3,3a,4,5,5a,6,7,8-Decahydro-pyrene

M. P., °C

34⁵⁸

B. P., °C @ 760mm

160

5³⁵ D_4^{20} 1.0612⁵⁸

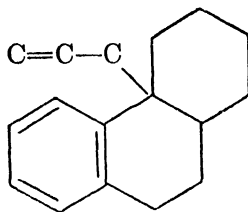
1.0553

25° 35

 n_D^{20} 1.5806⁵⁸

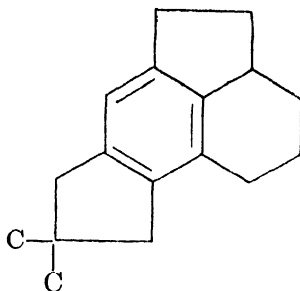
1.5782

25° 35

 $C_{17}H_{22}$ **4a-(Propen-2'-yl)-1,2,3,4,4a,9,10,10a-octahydrophenanthrene**

B. P., °C @ 760mm

118

0.2²⁸**6,7-(4',4'-Dimethylcyclopentano)-2a,3,4,5-tetrahydroacenaphthene**

B. P., °C @ 760mm

173-175

13²¹ D_4^{20}

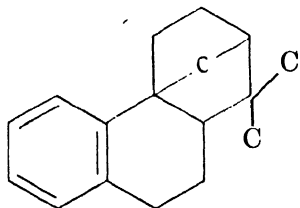
0.9884

22° 21

 n_D^{20}

1.5399

22° 21

1,1-Dimethyl-2,4a-endomethylene-1,2,3,4,4a,9,10,10a-octahydrophenanthrene (a)

B. P., °C @ 760mm

132.5-133.5

1³ D_4^{20}

1.0252

 D_0^{19}

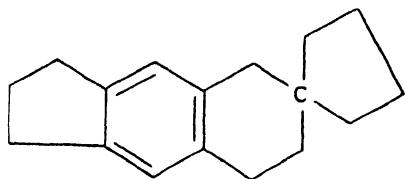
n_D^{20}

1.5578

19°³

- (a) The structure of this compound was not clearly defined in the literature.

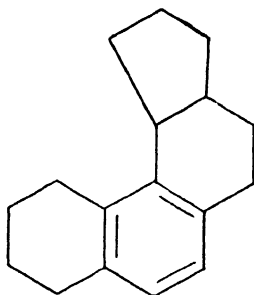
Spiro[6,7-cyclopentano-1,2,3,4-tetrahydronaphthalene-2,1'-cyclopentane]



M. P., °C

64-65⁴⁸

3,4-Cyclopentano-1,2,3,4,5,6,7,8-octahydrophenanthrene

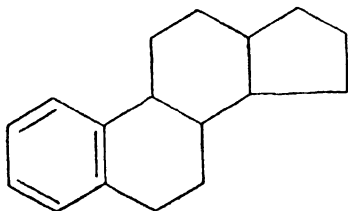


B. P., °C @ 760mm

172-173

5³⁷

1,2-Cyclopentano-1,2,3,4,4a,9,10,10a-octahydrophenanthrene

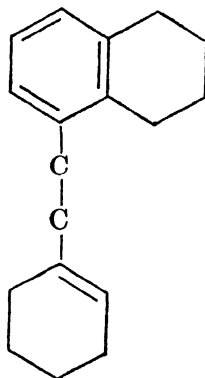


B. P., °C @ 760mm

201

16³⁰C₁₈H₂₄

5-[2'-(Cyclohexen-1''-yl)-ethyl]-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm

140-150

0.05¹⁰

1-Methyl-7-isopropyl-x₆-hexahydro-phenanthrene (a)

B. P., °C @ 760mm

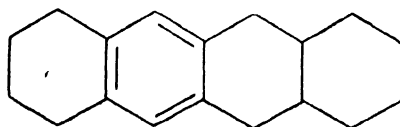
355³⁸

175-177

10¹, 5³ D_4^{20} 0.9802¹, 5³0.997³⁸ n_D^{20} 1.54705¹, 5³1.54770⁵³

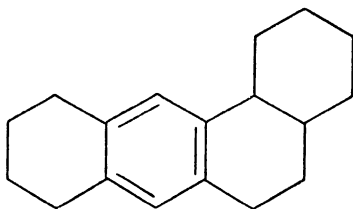
- (a) The structure of this compound was not clearly defined in the literature.

1,2,3,4,4a,5,7,8,9,10,12,12a-Dodecahydronaphthacene

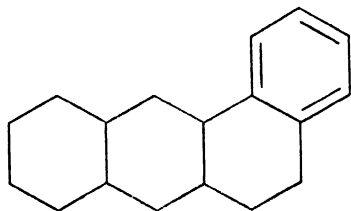


M. P., °C

82-83⁵⁵

1,2-Cyclohexano-1,2,3,4,5,6,7,8-octahydroanthracene

M. P., °C
87–88⁴

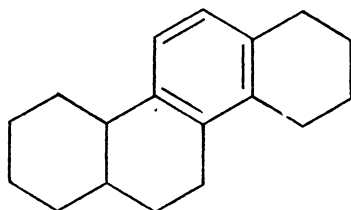
1,2-Benzododecahydroanthracene

M. P., °C
87–88¹¹
71–72^{4, 12}
71¹⁶
68–70¹⁵

Dodecahydro-x,x-benzoanthracene (a)

D_4^{20}
1.123³¹

(a) The structure of this compound was not clearly defined in the literature.

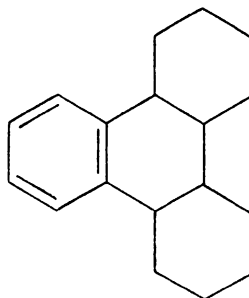
1,2,3,4,5,6,6a,7,8,9,10,10a-Dodecahydrochysene

M. P., °C
93–94³⁹

83–84⁴⁰55–57⁵⁶

B. P., °C @ 760mm

224–226

12⁵⁶**1,2,3,4,4a,4b,5,6,7,8,8a,12b-Dodecahydrotriphenylene**

B. P., °C @ 760mm

200–201.5

20⁴⁴ D_4^{20}

0.9468

19.2°⁴⁴ n_D^{20}

1.50432

 $n_{H\alpha}^{20}$ ⁴⁴

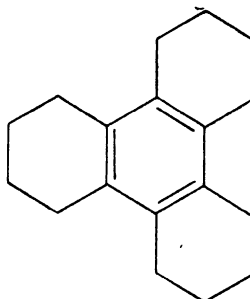
1.51382

 $n_{H\beta}^{20}$ ⁴⁴

1.5959

 $n_{H\gamma}^{20}$ ⁴⁴

1.50693

 $n_{H\epsilon}^{20}$ ⁴⁴**1,2,3,4,5,6,7,8,9,10,11,12-Dodecahydrotriphenylene**

M. P., °C

232

232–233^{18, 34, 45, 59}232⁵231–232⁵⁹

226-228⁵²226⁵¹ D_4^{20}

1.141

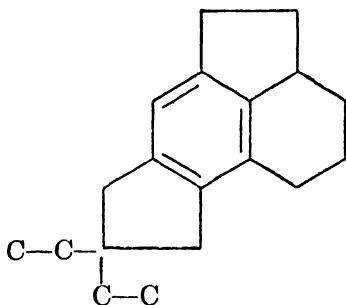
0° 60

1.148

0° 60

C₁₉H₂₆

6,7-(4',4'-Diethylcyclopentano)-
2a,3,4,5-tetrahydroacenaph-
thene



B. P., °C @ 760mm

190-195

16^{21, 22}

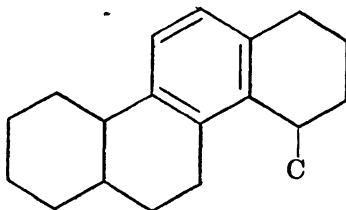
4-Methyldodecahydro-1,2-benzo-
anthracene (a)

M. P., °C

92.5-93.5¹⁷

(a) The structure of this compound
was not clearly defined in the
literature.

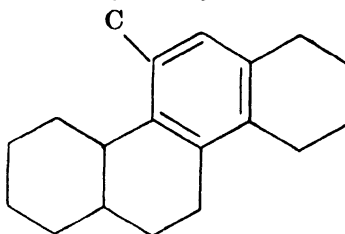
4-Methyl-1,2,3,4,5,6,6a,7,8,9,10,
10a-dodecahydrochrysene



M. P., °C

87-87.5⁴⁰

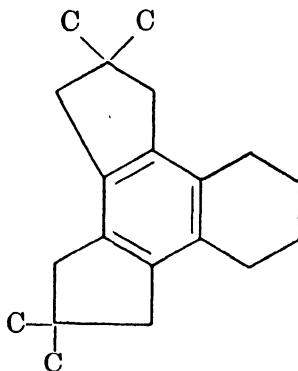
11-Methyl-1,2,3,4,5,6,6a,7,8,9,10a-
dodecahydrochrysene



M. P., °C

98.8-99.8²⁰C₂₀H₂₈

5,6,7,8-Di-(4',4'-dimethylcyclo-
pentano)-1,2,3,4-tetrahydro-
naphthalene



M. P., °C

105-106^{21, 22}C₂₂H₃₂

x,x-Dicyclohexyl-1,2,3,4-tetra-
hydronaphthalene (a)

M. P., °C

-4⁴²

B. P., °C @ 760mm

198-203

3⁴² D_4^{20}

0.9978

40° 42

1.0145

 D_{15}^{15} n_D^{20} 1.5618⁴²

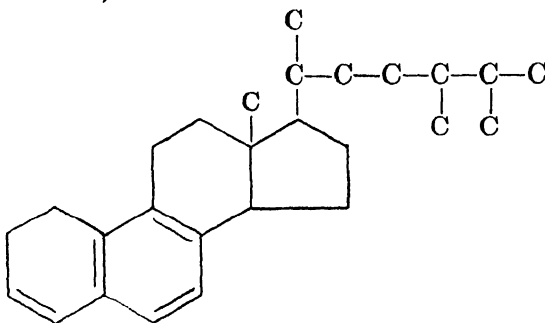
1.5548

40° 42

- (a) The structure of this compound was not clearly defined in the literature.



1,2-[3'-(5'',6''-Dimethyl-*sec*-heptyl)-cyclopentano]-2-methyl-1,2,3,4,5,6-hexahydrophenanthrene
(Neoergostatetraene)



M. P., °C
63–64²⁹

*References on Miscellaneous Polynuclear
Aromatics of Empirical Formula
 C_nH_{2n-12}*

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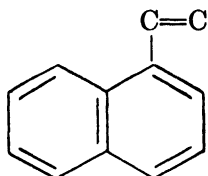
IV. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-14}

1. Naphthalene Derivatives of Empirical Formula C_nH_{2n-14}
2. Cyclanonaphthalenes and Their Alkyl Derivatives
3. Tetrahydroanthracenes, Tetrahydrophenanthrenes, and Their Alkyl Derivatives
4. Miscellaneous Polynuclear Aromatics of Empirical Formula C_nH_{2n-14}

1. NAPHTHALENE DERIVATIVES OF EMPIRICAL FORMULA



1-Ethenynaphthalene



B. P., °C @ 760mm

126-128	15 ¹⁶
124-125	15 ³²
116-117	8 ²⁹
105-106	6 ³⁴
103-104	4 ³⁴
115-116	3-4 ³²

D_4^{20}

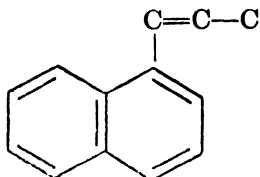
1.034 ²⁰	
1.0656 ³⁴	
1.0439	$D_{24}^{24, 29}$
1.0361	18° ³²
1.0774	0° ³⁴

n_D^{20}

1.6388 ³⁴	
1.6436 ^{20, 32}	
1.6425	24° ²⁹



1-(Propen-1'-yl)-naphthalene



B. P., °C @ 760mm

275-278 ³³	
147-149	15 ³³
135-136	12 ²³

137-138 10²⁸

112-113 6³⁴

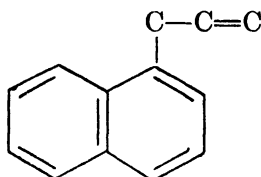
D_4^{20}

1.0282³⁴
1.0429 0°³⁴

n_D^{20}

1.6335³⁴

1-(Propen-2'-yl)-naphthalene



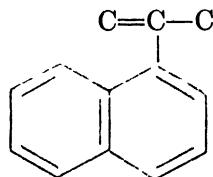
B. P., °C @ 760mm

265-267³³
130-131 12²²
127.5-128.5 8⁹

n_D^{20}

1.6089 25°⁹

1-Isopropenylnaphthalene



B. P., °C @ 760mm

256-257 ¹⁴	
251-251.5	744 ²⁰
130-132	15 ¹³
123-125	10-11 ⁵
125	8 ^{8, 10, 11, 12}
112-113	6 ³⁴
107-109	4 ³⁴
97	0.1 ²⁸

D_4^{20} 1.027³⁴

1.0078

1.0143

1.0208

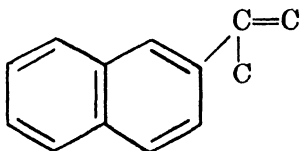
25°³⁰9°^{10, 11}0°^{10, 11} n_D^{20} 1.6142³⁴

1.6070

1.6068

1.6040

1.61435

25°²⁸25°³⁰16°¹³9°^{10, 11}**2-Isopropenylnaphthalene**

M. P., °C

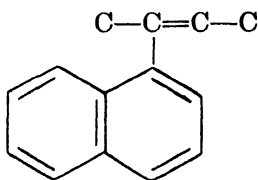
56²46-47^{10, 11}45-47¹²

B. P., °C @ 760mm

126-127

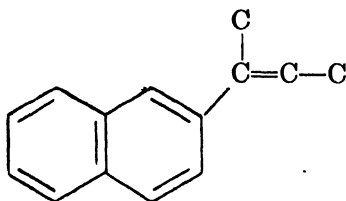
155

138-140

12²⁷11²7¹² $C_{14}H_{14}$ **2-(1'-Naphthyl)-butene-2**

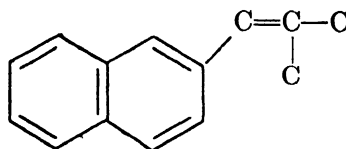
B. P., °C @ 760mm

113.5-115

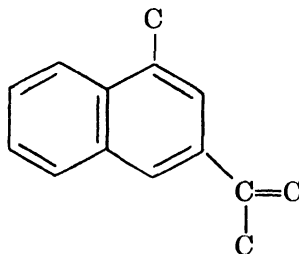
5³⁴ D_4^{20} 1.0533³⁴ n_D^{20} 1.6137³⁴**2-(2'-Naphthyl)-butene-2**

B. P., °C @ 760mm

108-112

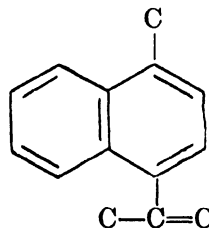
0.15² n_D^{20} 1.6202²**1-(2'-Naphthyl)-2-methylpropene-1**

B. P., °C @ 760mm

287-288¹⁵**1-Methyl-3-isopropenylnaphthalene**

B. P., °C @ 760mm

154

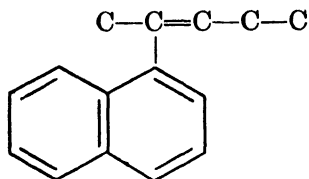
12⁷**1-Methyl-4-isopropenylnaphthalene**

B. P., °C @ 760mm

140

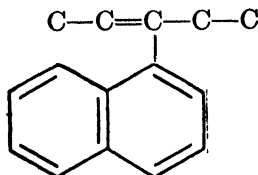
16⁸

C₁₅H₁₆
2-(1'-Naphthyl)-pentene-2



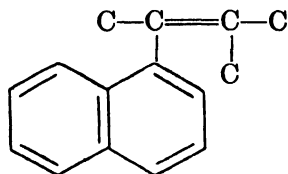
B. P., °C @ 760mm	158-160	20 ³¹
D_4^{20}	1.0094	22° 31
n_D^{20}	1.59206	22° 31

3-(1'-Naphthyl)-pentene-2



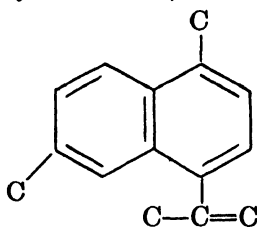
B. P., °C @ 760mm	119-120	6 ³⁴
D_4^{20}	1.034 ³⁴	
n_D^{20}	1.597 ³⁴	

2-Methyl-3-(1'-naphthyl)-butene-2



B. P., °C @ 760mm	165-166	23 ³¹
D_4^{20}	1.0039	19° 31
n_D^{20}	1.59343	19° 31

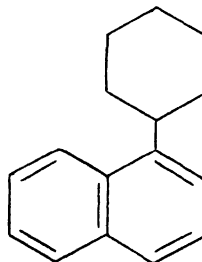
1,6-Dimethyl-4-isopropenylnaphthalene
(Dehydrocadalene)



B. P., °C @ 760mm	154	14 ¹
	155-157	12 ²¹
D_4^{20}	0.9731 ²¹	
n_D^{20}	1.5572 ²¹	

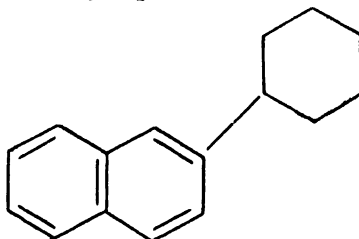
C₁₆H₁₈

1-Cyclohexylnaphthalene



B. P., °C @ 760mm	118-120	0.3 ⁶
D_4^{20}	1.044	15° 6
n_D^{20}	1.6099	17° 6
	1.6000	11° 6

2-Cyclohexylnaphthalene



M. P., °C	
31 ⁴ , 6, 24	
B. P., °C @ 760mm	
190–195	15 ²⁵
D_4^{20}	
1.0074	40° 24
1.0049	$D_{15}^{40\ 24}$
1.020	$D_{25}^{25\ 25}$
n_D^{20}	
1.5973 ²⁵	.
1.5925	40° 24

1-Methyl-x-cyclopentyl-naphthalene
(a)

B. P., °C @ 760mm	
156–158	1 ²³
D_4^{20}	
1.0353 ²³	
1.0419	$D_{15}^{15\ 23}$
n_D^{20}	
1.6088 ²³	

(a) The structure of this compound was not clearly defined in the literature.

$C_{17}H_{20}$

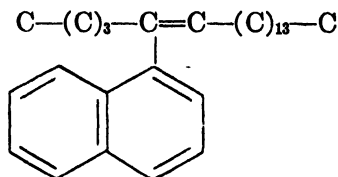
2-(2'-Naphthyl)-5-methylhexene-x
(a)

B. P., °C @ 760mm	
175–178	10 ^{10, 12}
D_4^{20}	
0.9728	9° 10
0.9808	0° 10, 12
n_D^{20}	
1.59124	9° 10, 12

(a) The double bond may be in either the 1- or 2-position.

$C_{30}H_{46}$

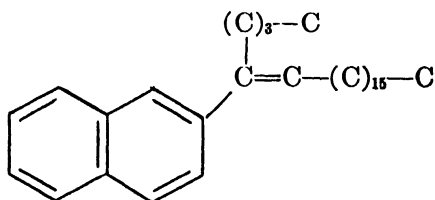
5-(1'-Naphthyl)-eicosene-5



D_4^{20}	0.9107 ¹⁷	
n_D^{20}	1.53019 ¹⁷	
	1.52536	$n_{H\alpha}^{20\ 17}$
	1.54290	$n_{H\beta}^{20\ 17}$

$C_{32}H_{50}$

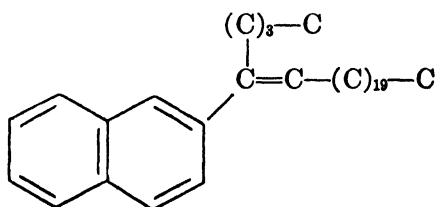
5-(2'-Naphthyl)-docosene-5



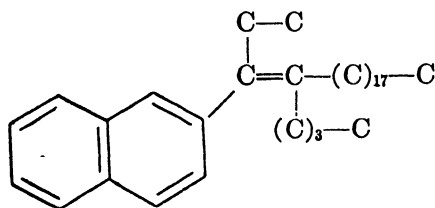
D_4^{20}	0.9081	25° 18
	0.915	$D_{15.6}^{15.6\ 19}$
n_D^{20}	1.5300	25° 18

$C_{36}H_{58}$

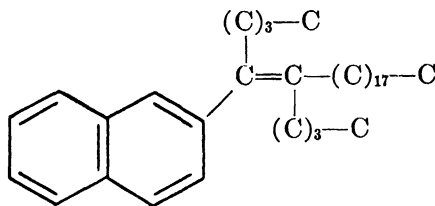
5-(2'-Naphthyl)-hexacosene-5



D_4^{20}	0.8830	25° 18
	0.889	$D_{15.6}^{15.6\ 19}$
n_D^{20}	1.5128	25° 18

3-(2'-Naphthyl)-4-*n*-butyldocosene-3

D_4^{20}	0.8960	$25^\circ 18$
	0.902	$D_{15.6}^{15.6 19}$
n_D^{20}	1.5170	$25^\circ 18$

5-(2'-Naphthyl)-6-*n*-butyltetra-cosene-5

D_4^{20}	0.8896	$25^\circ 18$
	0.895	$D_{15.6}^{15.6 19}$
n_D^{20}	1.5161	$25^\circ 18$

References on Naphthalene Derivatives of Empirical Formula C_nH_{2n-14}

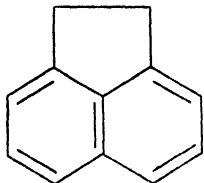
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2. CYCLANONAPHTHALENES AND THEIR ALKYL DERIVATIVES, C_nH_{2n-14}



Acenaphthene



M. P., °C

95.4
 100^{30, 80}
 99–100²⁹
 99^{37, 72}
 96.5⁴⁶
 96.2^{19, 20, 21}
 94–96^{2, 31}
 95.5¹⁸
 95.0^{39, 65}
 95(a)
 94.1⁵⁵
 94.0³⁸
 94²⁸
 93–94³⁴
 93.5^{51, 61, 78}
 93.3^{54, 77}
 93^{4, 5, 6}
 92–93^{58, 59}
 92.5²⁷
 92.1¹⁶

B. P., °C @ 760mm

277.3
 279^{30, 62, 83}
 278⁸⁴
 277.9⁴⁴
 277.5^{1, 3, 41, 68}
 277.3⁵⁵
 287.8 943.0⁵⁵

287.0	932.3 ⁵⁵
286.8	930.3 ⁵⁵
275.4	733.4 ⁵⁵
275.3	733.4 ⁵⁵
264.4	573.5 ⁵⁵
264.4	573.1 ⁵⁵
252.5	434.7 ⁵⁵
252.4	434.5 ⁵⁵
247.0	382.9 ⁵⁵
246.6	377.9 ⁵⁵
246.2	374.6 ⁵⁵
233.2	272.0 ⁵⁵
229.5	250 ⁶⁴
227.2	234.6 ⁵⁵
210.4	149.0 ⁵⁵
210.2	148.0 ⁵⁵
182.4	63.6 ⁵⁵
147	20 ⁴⁸
147.2	19.2 ⁵⁵
144	12 ⁶²
20.0	<.02 ⁴⁵

D_4^{20}

1.220 (solid) (b) ⁵⁶	
0.962	178.7° ¹⁸
1.003	128.6° ¹⁸
1.0300	103° ⁷³
1.0685	$D_{100}^{100, 64}$
1.0242	99.2° ⁸¹
1.0331	98.8° ¹⁵
1.0687	$D_{95}^{95, 64}$
1.2195	24.8° ³²

n_D^{20}

1.60658	99.2° ⁸¹
1.60482	98.8° ¹⁵
1.59877	$n_{H\alpha}^{99.2, 81}$
1.59772	$n_{H\alpha}^{98.8, 15}$

1.62838

 $n_{\text{H}\beta}^{99.2\ 81}$

1.62705

 $n_{\text{H}\beta}^{98\ 8\ 15}$

Additional Data

Crit. Temp. (°C)

530.0³²

$$\frac{1}{T_b} = 0.0028359 - 0.0003538 \log_{10} p_{\text{mm}}$$

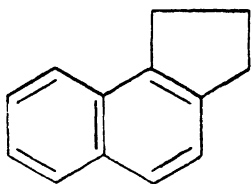
(60 to 945mm)

(a) The melting point 95 is found in references 1, 3, 7, 15, 24, 33, 35, 47, 52, 53, 57, 60, 62, 63, 67, 68, 69, 74, 79, 81, 83, 84.

(b) The temperature of this determination was not given.

C₁₃H₁₂

1,2-Cyclopentanonaphthalene



B. P., °C @ 760mm

296–296.6

757.5¹⁷

294–295

757⁴⁰

170

15¹⁴

118

0.5³⁶ D_4^{20} 1.066⁴⁰

1.0569

19.6°³⁶

1.0671

17.5°¹⁷ n_D^{20} 1.6290⁴⁰

1.6323

19.7°¹⁴

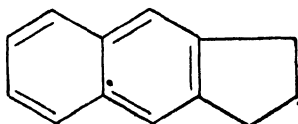
1.62649

19.6°³⁶

1.6325

17.5°¹⁷

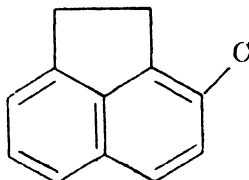
2,3-Cyclopentanonaphthalene



M. P., °C

94^{75, 76}

3-Methylacenaphthene



M. P., °C

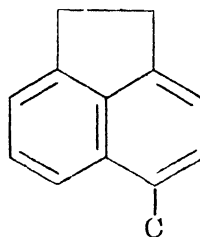
57¹¹

B. P., °C @ 760mm

130–135

3¹¹

5-Methylacenaphthene



M. P., °C

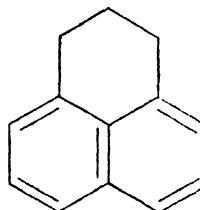
88¹¹

B. P., °C @ 760mm

125

12¹¹

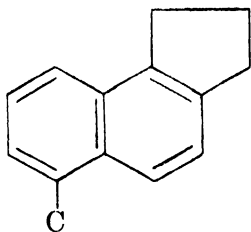
Phenalan



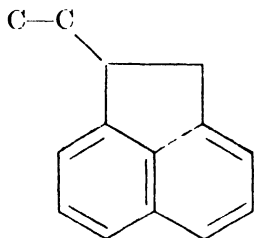
M. P., °C

65.4

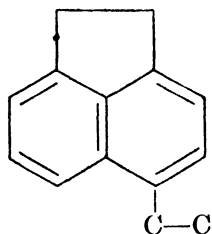
68–69⁴²66–67²⁶65.1–65.4²²65¹²

$C_{14}H_{14}$ **1,2-Cyclopentano-5-methylnaphthalene**

M. P., °C
44⁵⁰

1-Ethylacenaphthene

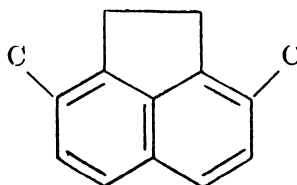
M. P., °C
34.8-35.1²³
30¹³

5-Ethylacenaphthene

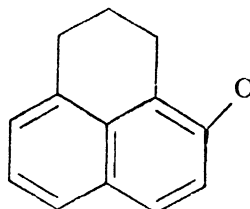
M. P., °C
42.5-43.0⁷⁰
42.5-43²⁶

B. P., °C @ 760mm
310¹⁸
166
160
158

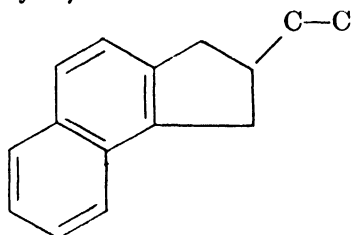
20⁴⁸
20⁷⁰
13²⁶

 D_4^{20} 1.0407²⁶ n_D^{20} 1.6117²⁶**3,8-Dimethylacenaphthene**

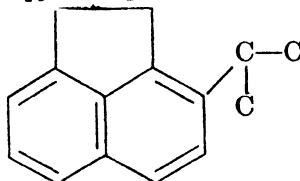
M. P., °C
68¹¹

4-Methylphenalan

B. P., °C @ 760mm
160-170
7⁹

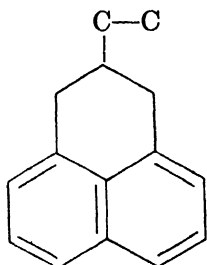
 $C_{15}H_{16}$ **2-Ethyl-4,5-benzoindane**

B. P., °C @ 760mm
157-160
14⁴⁹

3-Isopropylacenaphthene

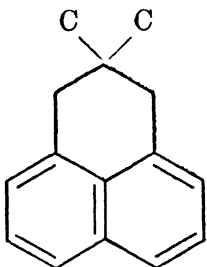
B. P., °C @ 760mm

145–150

0.8¹¹**2-Ethylphenalan**

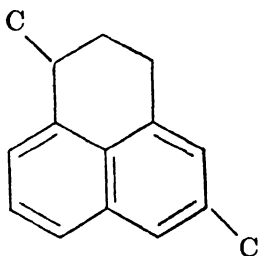
B. P., °C @ 760mm

167–168

16⁴⁹**2,2-Dimethylphenalan**

B. P., °C @ 760mm

168–170

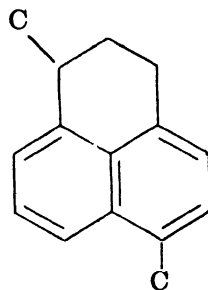
17⁸**1,5-Dimethylphenalan**

M. P., °C

43–44¹⁰

B. P., °C @ 760mm

150–160

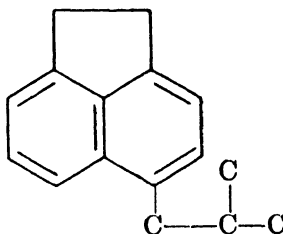
1.2¹⁰**1,6-Dimethylphenalan**

M. P., °C

75¹⁰

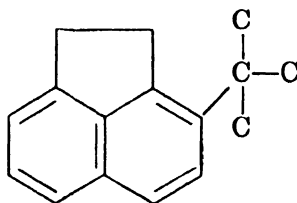
B. P., °C @ 760mm

150

0.8¹⁰**C₁₆H₁₈****5-Isobutylacenaphthene**

B. P., °C @ 760mm

138–139

0.5⁴³**3-tert-Butylacenaphthene**

M. P., °C

73–74⁶⁶

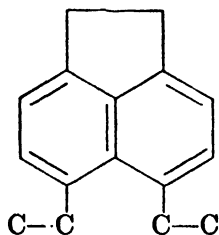
B. P., °C @ 760mm

170–174

7⁶⁶

155–160

0.8¹¹**5,6-Diethylacenaphthene**

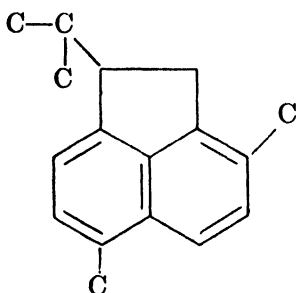


M. P., °C

10-11²⁶, 70

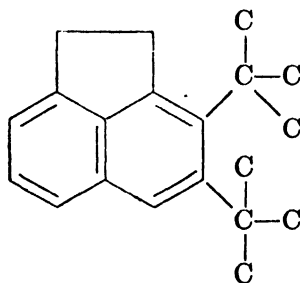
B. P., °C @ 760mm

182

14²⁶, 70 $C_{17}H_{20}$ **1-Isopropyl-3,6-dimethylacenaphthene**

B. P., °C @ 760mm

125

0.05⁷¹ $C_{20}H_{26}$ **3,4-Di-*tert*-butylacenaphthene**

M. P., °C

162-163⁶⁶

B. P., °C @ 760mm

358-360

758⁶⁶*References on Cyclanonaphthalenes and Their Alkyl Derivatives*

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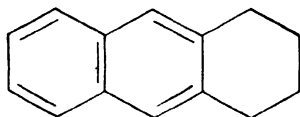
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3. TETRAHYDROANTHRACENES, TETRAHYDROPHENANTHRENES, AND THEIR ALKYL DERIVATIVES,

C_nH_{2n-14}

$C_{14}H_{14}$

1,2,3,4-Tetrahydroanthracene (Tetracene)



M. P., °C

103.5

106-107³⁰

104-105²¹

103-105^{17, 28}

104³³

103-104¹⁸

103^{7, 16}

100.5-101.5²³

101^{10, 12}

B. P., °C @ 760mm

170-173

14¹⁸

x,x,9,10-Tetrahydroanthracene (a)

M. P., °C

89^{8, 9, 11, 28}

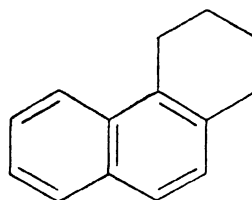
74³³

B. P., °C @ 760mm

309-313^{8, 9, 11}

(a) The structure of this compound was not clearly defined in the literature.

1,2,3,4-Tetrahydrophenanthrene (Tetanthere)



M. P., °C

33.5

34-35⁶

33-34^{20, 29, 31}

32.5-33.5¹

33²⁴

B. P., °C @ 760mm

173

11³¹

170-171

10⁶

D_4^{20}

1.0601

40°³¹

x₄-Tetrahydrophenanthrene (a)

M. P., °C

70³

14³⁵

-4--3²⁷

-5--4²⁷

B. P., °C @ 760mm

310^{4, 13, 14, 19}

302-302.5²⁵

302¹⁴

306-308

737²⁷

307

737²⁷

302-303

737²⁷

300-304

723²

147

18²⁵

145-149

9²⁶

D_4^{20}

1.080 ²⁷	
1.085 ²⁷	
1.0707	24.0° ³⁵
1.02887	16.8° ²⁵
1.02934	12.3° ²⁵
1.067	10.2° ¹³

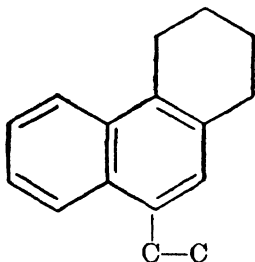
 n_D^{20}

1.5820 ²⁷	
1.57909	16.8° ²⁵
1.58112	12.3° ²⁵
1.61880	$n_{H\alpha}^{24.0\ 35}$
1.57373	$n_{H\alpha}^{16.8\ 25}$
1.57560	$n_{H\alpha}^{12.3\ 25}$
1.64684	$n_{H\beta}^{24.0\ 35}$
1.59369	$n_{H\beta}^{16.8\ 25}$
1.59550	$n_{H\beta}^{12.3\ 25}$
1.62660	$n_{He}^{24.0\ 35}$

- (a) The structure of this compound was not clearly defined in the literature. The data probably represent more than one compound.

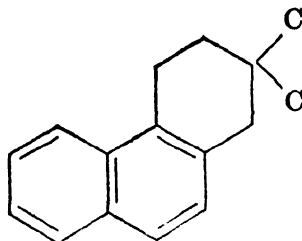
C₁₆H₁₈

9-Ethyl-1,2,3,4-tetrahydrophenanthrene



M. P., °C
23–25¹

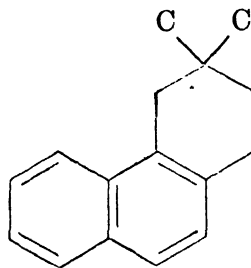
2,2-Dimethyl-1,2,3,4-tetrahydrophenanthrene



B. P., °C @ 760mm
161–163

6³²

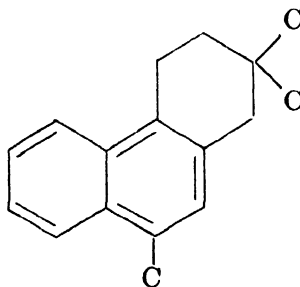
3,3-Dimethyl-1,2,3,4-tetrahydrophenanthrene



B. P., °C @ 760mm
155–157

7³²C₁₇H₂₀

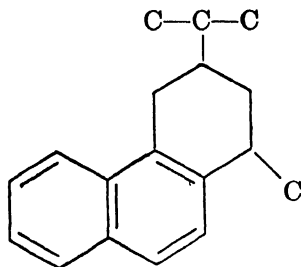
2,2,9-Trimethyl-1,2,3,4-tetrahydrophenanthrene



M. P., °C
90–91³²

C₁₈H₂₂

1-Methyl-3-isopropyl-1,2,3,4-tetrahydrophenanthrene



B. P., °C @ 760mm

208

23⁵**1-Methyl-7-isopropyl-4-tetrahydrophenanthrene (a)**

B. P., °C @ 760mm

360-366²²

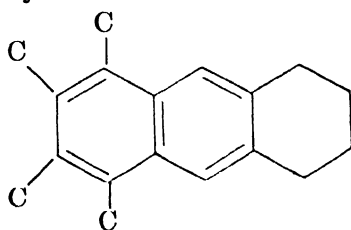
280

50²

180-183

10³⁴ D_4^{20} 1.0057³⁴1.011²² n_D^{20} 1.56061³⁴

(a) The structure of this compound was not clearly defined in the literature.

5,6,7,8-Tetramethyl-1,2,3,4-tetrahydroanthracene

M. P., °C

127.5-128¹⁵

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4. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-14}

**x,x-Dihydrofluorene (a)**

M. P., °C

109⁵, 7, 8

B. P., °C @ 760mm

251-254⁵, 7, 8

- (a) The structure of this compound was not clearly defined in the literature.

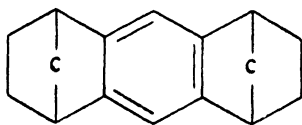
**x₃-Octahydrofluoranthene (a)**

(Octahydroidryl)

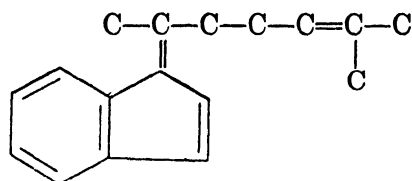
B. P., °C @ 760mm

309-311³

- (a) The structure of this compound was not clearly defined in the literature.

1,4,5,8-Diendomethylene-1,2,3,4,5,6,7,8-octahydroanthracene

M. P., °C

157²**2-(1'-Indenylidene)-6-methylheptene-5**

B. P., °C @ 760mm

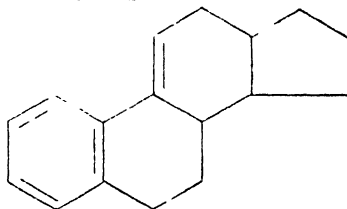
130

0.2⁹*D*₄²⁰

0.9680

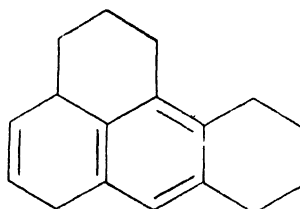
24°⁹*n*_D²⁰

1.5942

24°⁹**1,2-Cyclopentano-1,2,3,9,10,10a-hexahydrophenanthrene**

B. P., °C @ 760mm

164-165

3⁴**4,5-Cyclohexano-7,9a-dihydrophenalan**

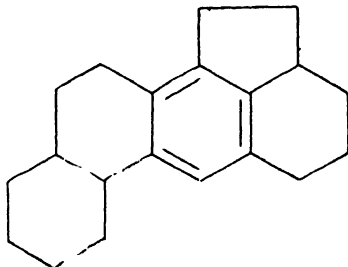
B. P., °C @ 760mm

213-214

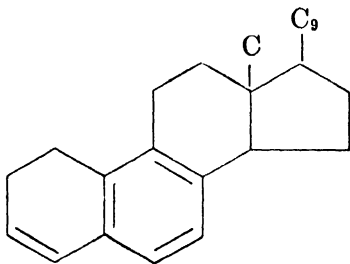
13¹⁰



2a,3,4,5,6b,7,8,9,10,10a,11,12-Dodecahydrocholanthrene



M. P., °C
62–63¹

1,2-(3'-Nonylcyclopentano)-2-methyl-1,2,3,4,5,6-hexahydro-phenanthrene
(Ergopentacene)

M. P., °C
89–90¹¹

Additional Data

$$[\alpha]_D^{19} = +69.5^\circ{}^{11}$$

$$[\alpha]_D^{19} = +66.7^\circ{}^{11}$$



Tolylcholestane (a)

M. P., °C
202 (b)⁶
120 (b)⁶

- (a) The structure of this compound was not clearly defined in the literature.
- (b) These constants were determined on isomeric forms.

References on Miscellaneous Polynuclear Aromatics of Empirical Formula C_nH_{2n-14}

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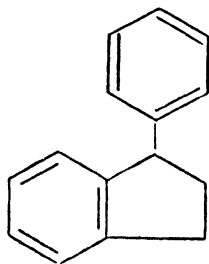
V. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-16}

1. Indane with One Phenyl Substitution
2. Naphthalene Derivatives of Empirical Formula C_nH_{2n-16}
3. Tetrahydronaphthalene with One Phenyl Substitution
4. Biphenylene, Fluorene, and Their Alkyl Derivatives
5. Dihydroanthracenes, Dihydrophenanthrenes, and Their Alkyl Derivatives
6. Miscellaneous Polynuclear Aromatics of Empirical Formula C_nH_{2n-16}

1. INDANE WITH ONE PHENYL SUBSTITUTION, C_nH_{2n-16}



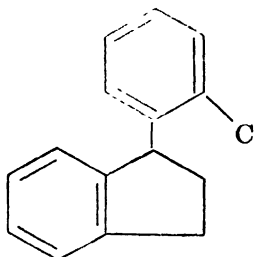
1-Phenylindane



B. P., °C @ 760mm
148–150 13⁴



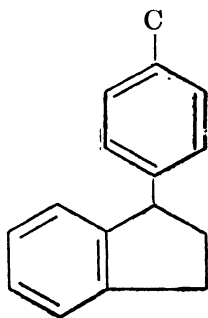
1-*o*-Tolylindane



M. P., °C
57⁹

B. P., °C @ 760mm
160–162 14⁹

1-*p*-Tolylindane

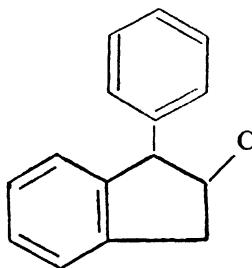


B. P., °C @ 760mm
168–170 14⁹

D_4^{20}
1.0455⁹

n_D^{20}
1.5878⁹

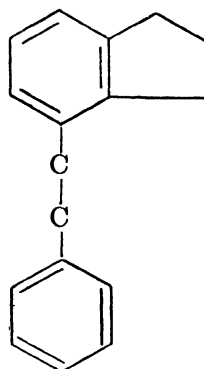
1-Phenyl-2-methylindane



B. P., °C @ 760mm
181 10³



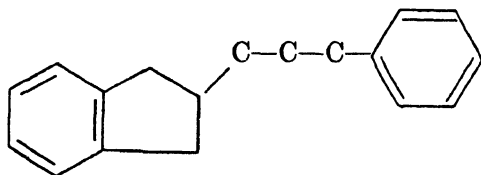
4-Phenethylindane



B. P., °C @ 760mm
115–120 0.0001⁵

D_4^{20}
1.020 25°⁵

n_D^{20}
1.5640 29°⁵

C₁₈H₂₀**1-Phenyl-3-(2'-indanyl)-propane (a)**

B. P., °C @ 760mm

197

13⁸ D_4^{20}

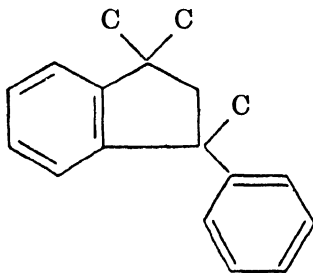
1.0128

18°⁸ n_D^{20}

1.5667

18°⁸

(a) This compound was given as 2γ-phenylpropylhydrindene in the literature, but no structural formula was given.

1,1,3-Trimethyl-3-phenylindane

M. P., °C

53²52¹⁰

B. P., °C @ 760mm

307-310⁶

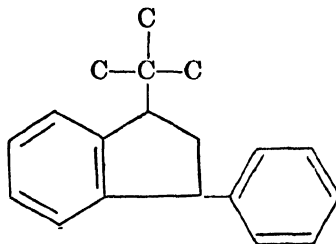
166-167

25²

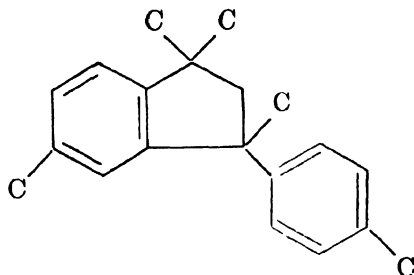
165-166

24²

155

12² D_4^{20} 1.0009⁶ n_D^{20} 1.56809⁶C₁₉H₂₂**1-tert-Butyl-3-phenylindane**

M. P., °C

181-182¹C₂₀H₂₄**1,1,3,5-Tetramethyl-3-p-tolylindane**

M. P., °C

37.5-38.5⁷

B. P., °C @ 760mm

328.5-329

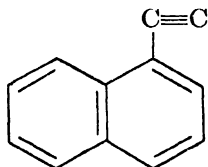
759⁷*References on Indane with One Phenyl Substitution*

1. Althausen, D., and C. S. Marvel, J. Am. Chem. Soc. **54**, 1174 1932.
2. Bergmann, E., Ber. **64**, 1493 1931.
3. Blum-Bergmann, O., Ber. **65**, 109 1932.
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5. Natelson, S., and S. P. Gottfried, J. Am. Chem. Soc. **58**, 1432 1936.
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7. Puranene, N., Suomen Kemistilehti **5**, 42B 1932; Chem. Zentr. **1933**, I, 934.
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2. NAPHTHALENE DERIVATIVES OF EMPIRICAL FORMULA

 C_nH_{2n-16} $C_{12}H_8$

1-Ethynylnaphthalene

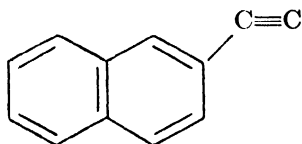


B. P., °C @ 760mm

143-44

25^{15, 17} D_4^{20} 1.057¹⁷

2-Ethynylnaphthalene



M. P., °C

36^{16, 22}

B. P., °C @ 760mm

104-107

2²³

104-107

1²² $C_{13}H_{10}$

1-(Propyn-x'-yl)-naphthalene (a)

B. P., °C @ 760mm

154

15¹ D_4^{20}

1.056

13°⁴

1.066

0°⁴ n_D^{20}

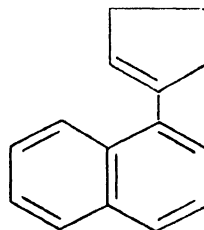
1.630

13°⁴

(a) The double bond may be in either the 1- or 2-position.

 $C_{16}H_{14}$

1-(Cyclopenten-1'-yl)-naphthalene



M. P., °C

-2 (a)¹

B. P., °C @ 760mm

165-168

1¹

115

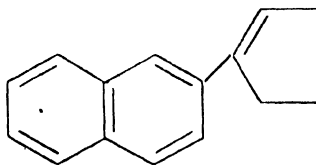
0.04² D_4^{20}

1.0611

24°² n_D^{20} 1.6285²

(a) This constant was given as a freezing point in the literature.

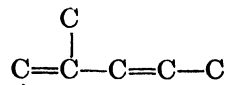
2-(Cyclopenten-1'-yl)-naphthalene



M. P., °C

85-86¹ $C_{16}H_{16}$

1-(1'-Naphthyl)-2-methylpentadiene-1,3



B. P., °C @ 760mm

178-181

12⁵

D_4^{20}

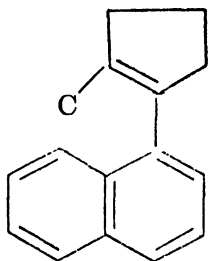
0.9801

25°⁵ n_D^{20}

1.56967

25°⁶

1-(1'-Naphthyl)-2-methylcyclopentene-1

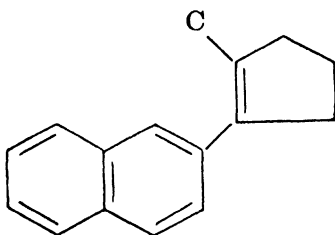


B. P., °C @ 760mm

165-168

1¹

1-(2'-Naphthyl)-2-methylcyclopentene-1

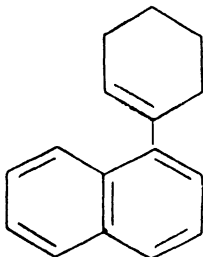


B. P., °C @ 760mm

180-182

1¹

1-(Cyclohexen-1'-yl)-naphthalene



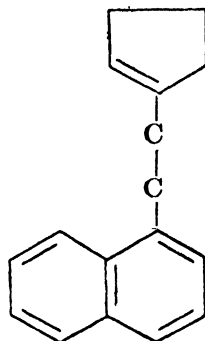
M. P., °C

46¹⁰44¹⁰36²³

B. P., °C @ 760mm

332²³C₁₇H₁₈

1-(Cyclopenten-1'-yl)-2-(1''-naphthyl)-ethane

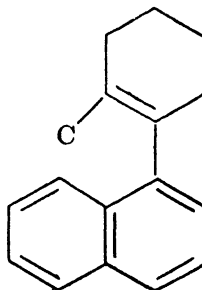


B. P., °C @ 760mm

164

4-5⁸ D_4^{20} 1.0298⁸ n_D^{20} 1.6034⁸

1-(1'-Naphthyl)-2-methylcyclohexene-1



M. P., °C

55-56¹⁸

B. P., °C @ 760mm

125

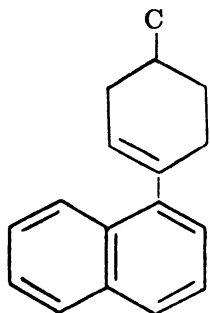
0.3¹¹ D_4^{20}

1.036

15.5¹¹ n_D^{20}

1.6111

15°¹¹

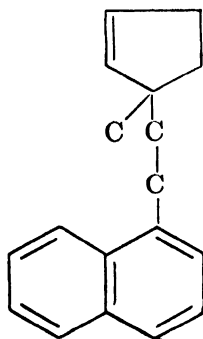
1-(1'-Naphthyl)-4-methylcyclohexene-1

B. P., °C @ 760mm	
142	0.15 ³
n_D^{20}	
1.6040	14° ³

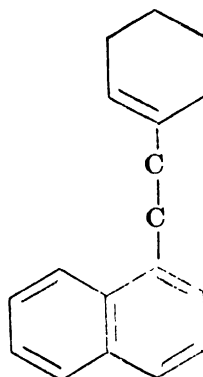
1-(1'-Naphthyl)-x-methylcyclohexene-1 (a)

B. P., °C @ 760mm	
131	0.2 ³
n_D^{20}	
1.6054	14° ³

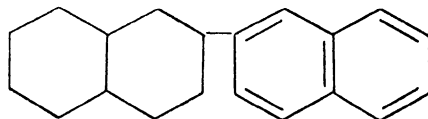
(a) The methyl group may be in either the 3- or 5-position.

**1-(1'-Methylcyclopentene-2'-yl)-2-(1''-naphthyl)-ethane**

B. P., °C @ 760mm	
168-172	0.5 ¹⁴

1-(Cyclohexen-1'-yl)-2-(1''-naphthyl)-ethane

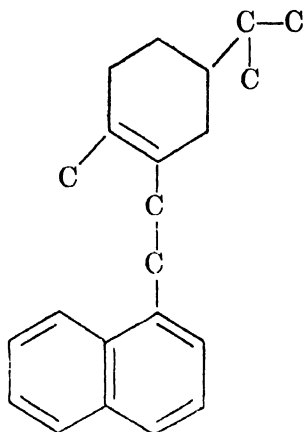
B. P., °C @ 760mm	
167-168	3-4°
135	0.1 ⁷
D_4^{20}	
1.0254	23.5° ⁹
1.0158	8° ⁷
n_D^{20}	
1.5993	23.6° ⁹
1.5992	8° ⁷

**3-(2'-Naphthyl)-bicyclo-[4,4,0]-decane**

M. P., °C	
67 (a) ¹³	
62 (a) ¹³	

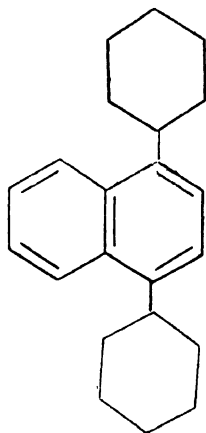
(a) These constants were determined on isomeric forms.

**1-(2'-Methyl-5'-isopropylcyclohexen-1'-yl)-2-(1''-naphthyl)-ethane**



B. P., °C @ 760mm

160-165

0.15¹²**1,4-Dicyclohexylnaphthalene**

M. P., °C

83-83.5²¹**x,x'-Dicyclohexylnaphthalene (a)**

M. P., °C

151-152⁶150-151¹⁹

B. P., °C @ 760mm

215-225

7²⁰

(a) The structure of this compound was not clearly defined in the literature.

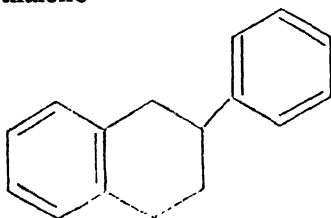
References on Naphthalene Derivatives of Empirical Formula C_nH_{2n-18}

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3. TETRAHYDRONAPHTHALENE WITH ONE PHENYL SUBSTITUTION, C_nH_{2n-16}



2-Phenyl-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm

180-181 13^{10}

D_4^{20}

1.0579 $18^\circ 10$

n_D^{20}

1.5980 $18^\circ 10$

x-Phenyl-1,2,3,4-tetrahydronaphthalene (a)

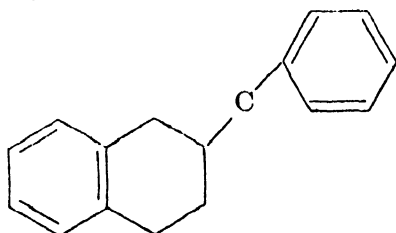
B. P., °C @ 760mm

184-187 14^7

(a) The phenyl group may be in either the 2- or 6-position.



2-Benzyl-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm

195 13^1

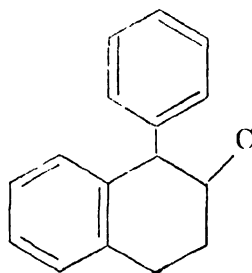
194-195 13^8

193 13^4

D_4^{20}

1.0428 $22.5^\circ 4$

1-Phenyl-2-methyl-1,2,3,4-tetrahydronaphthalene

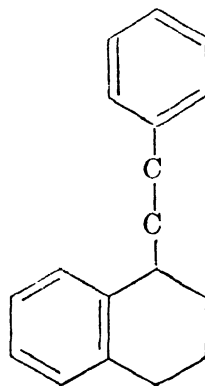


M. P., °C

46-47³



1-Phenethyl-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm

204-208 14^9

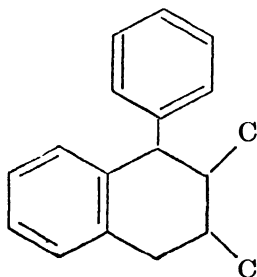
D_4^{20}

1.028 $18^\circ 9$

n_D^{20}

1.5770 $18^\circ 9$

1-Phenyl-2,3-dimethyl-1,2,3,4-tetrahydronaphthalene
(Methronol)

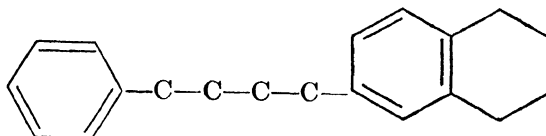


B. P., °C @ 760mm
322-323²

This series continued on next page

C₂₀H₂₄

1-Phenyl-4-[6'-(1',2',3',4'-tetrahydronaphthyl)]-butane



B. P., °C @ 760mm
236-237

13⁶

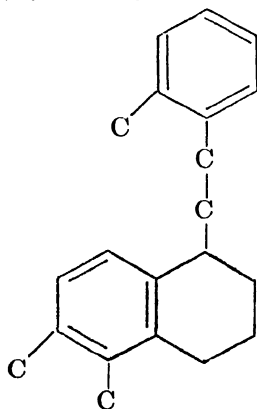
D₄²⁰

1.0172

22.5°⁶

C₂₁H₂₆

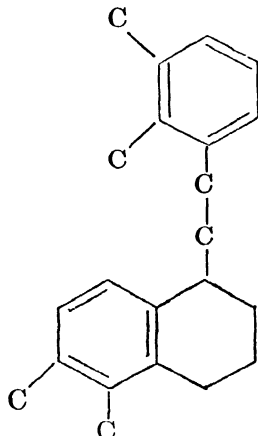
1-(2'-Methylphenethyl)-5,6-dimethyl-1,2,3,4-tetrahydronaphthalene



M. P., °C
53-54⁵



1-(2',3'-Dimethylphenethyl)-5,6-dimethyl-1,2,3,4-tetrahydronaphthalene



B. P., °C @ 760mm

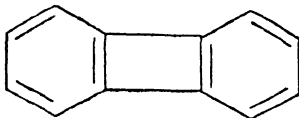
165

1⁵*References on Tetrahydronaphthalene with One Phenyl Substitution*

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4. BIPHENYLENE, FLUORENE, AND THEIR ALKYL DERIVATIVES, C_nH_{2n-16} 

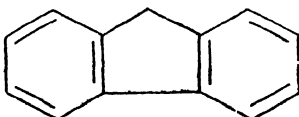
Biphenylene



M. P., °C

111-112⁶⁶109-110⁴⁸74.5-75²²74-75⁵⁹

Fluorene



M. P., °C

114

116-117^{4, 49}116^{16, 76, 77, 81}115-116⁸⁰115.0-115.8⁶¹115-115.5⁷⁷115.4³⁷115^{20, 35, 44, 46, 67, 75}114-115⁷⁸113-115³³114.8⁹114.5⁶⁶114-114.5¹⁵113.5-114.5^{19, 77}114.2⁵⁵114^{25, 68, 69, 72}113-114^{26, 30, 42, 48}113-113.5⁷⁷113.3⁶⁴

113(a)

112-113(b)

112.5^{39, 40}112.3^{23, 24}112.2⁴⁰112.0⁴⁰112^{47, 51}

B. P., °C @ 760mm

297.2

305^{12, 14, 29, 74}298.0⁵⁵296³²295^{52, 76}294–295^{23, 63}293–295^{49, 75}294⁶²300.4 812.3⁵⁵299.8 801.3⁵⁵295.7 738.8⁵⁵295.6 738.8⁵⁵277.1 490.7⁵⁵276.6 487.5⁵⁵241.4 208.4⁵⁵240.4 205.5⁵⁵203.0 70.5⁵⁵202.5 69.5⁵⁵170 26⁵⁵161.0 18.0⁵⁵ D_4^{20} 1.181(c) (solid)⁴¹1.200(c) (solid)⁵⁷1.207(c) (solid)³⁴ n_D^{20}

(d)

Additional Data

$$\frac{1}{T_b} = 0.0027238$$

$$- 0.0003369 \log_{10} p_{mm}$$

(200 to 813 mm)

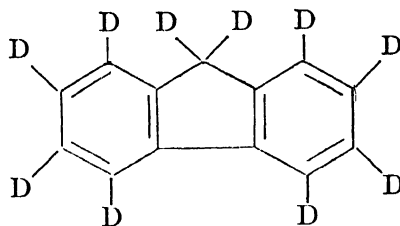
(a) The melting point 113 is found in references 1, 2, 3, 8, 10, 11, 12, 13, 14, 17, 27, 32, 36, 38, 45, 50, 52, 53, 60, 62, 65, 70, 71, 73, 74.

(b) The melting point 112–113 is found in references 5, 6, 7, 21, 28, 31, 63, 64, 79.

(c) The temperature of this determination was not given.

(d) Refractive indices at other lines are found in reference 58.

Decadeuterofluorene



M. P., °C

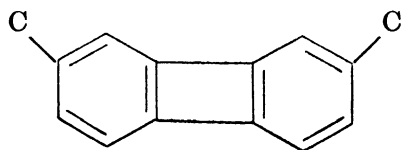
115–117¹⁸

References on Biphenylene and Fluorene

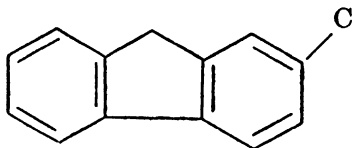
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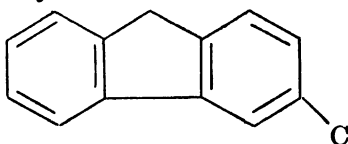
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**2,7-Dimethylbiphenylene**

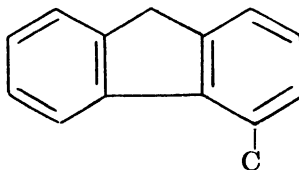
M. P., °C
112¹⁷

2-Methylfluorene

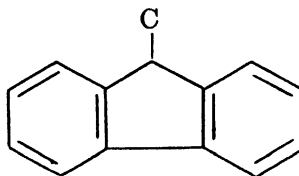
M. P., °C
104–105^{21, 22}
104¹⁴
102–103¹¹
B. P., °C @ 760mm
317–319¹⁴

3-Methylfluorene

M. P., °C
88–89^{20, 23}
88³³

4-Methylfluorene

M. P., °C
71.5–72.5²⁹
63¹⁹

9-Methylfluorene

M. P., °C
45.5
48¹²
46–47³⁵
46^{25, 37}
45–46^{5, 34}
45^{2, 30, 32, 36}
44.5⁴
44³¹
B. P., °C @ 760mm
157 18²⁷
141–144 16³²
154–156 15³⁶
*D*₄²⁰
1.070¹³
1.0263 66.2°³²

n_D^{20} 1.631¹⁸

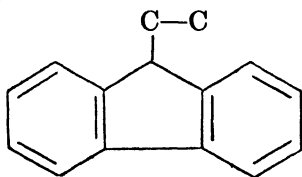
1.61009

66.2°³²

1.60233

 $n_{H\alpha}^{66.2}$ ³²

1.63189

 $n_{H\beta}^{66.2}$ ³² $C_{15}H_{14}$ **9-Ethylfluorene**

M. P., °C

108³⁷107–108³⁵106–107²⁸105²⁷

B. P., °C @ 760mm

306–310²⁵

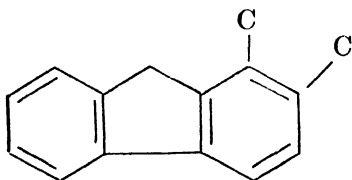
170

18²⁷

169–171

14³⁶

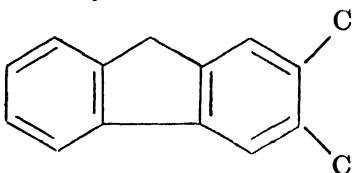
165–166

13³⁵**1,2-Dimethylfluorene (a)**

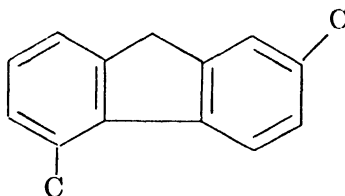
M. P., °C

107–108¹⁰

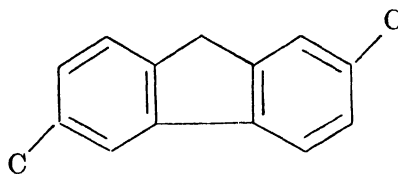
(a) The structure of this compound was not clearly defined in the literature.

2,3-Dimethylfluorene

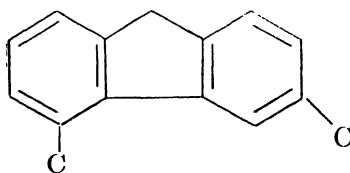
M. P., °C

125–126¹125^{1, 9}**2,5-Dimethylfluorene**

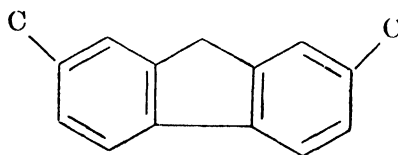
M. P., °C

58–59²⁴**2,6-Dimethylfluorene**

M. P., °C

66–67^{15, 16}**3,5-Dimethylfluorene**

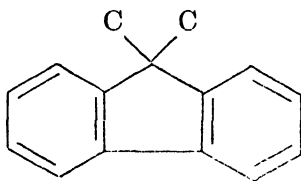
M. P., °C

81–82¹⁶**2,7-Dimethylfluorene**

M. P., °C

114–115¹⁶

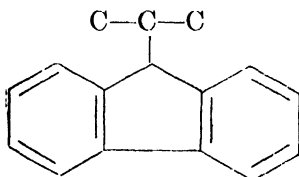
9,9-Dimethylfluorene



M. P., °C
70²

$C_{16}H_{16}$

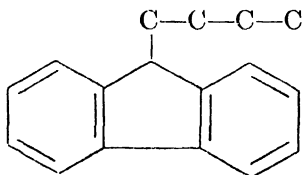
9-Isopropylfluorene



M. P., °C
54-55⁴
53-55¹⁸

$C_{17}H_{18}$

9-n-Butylfluorene



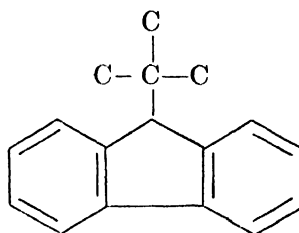
M. P., °C
101²⁸
B. P., °C @ 760mm
192-195 33²⁸

x-Isobutylfluorene (a)

M. P., °C
68-70⁸

(a) The structure of this compound was not clearly defined in the literature.

9-tert-Butylfluorene (a)

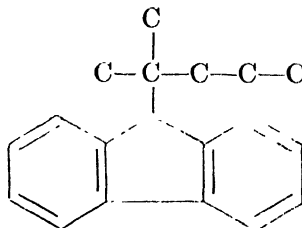


M. P., °C
101-102⁶
98-99²⁶

(a) The structure of this compound was not clearly defined in the literature.

$C_{19}H_{22}$

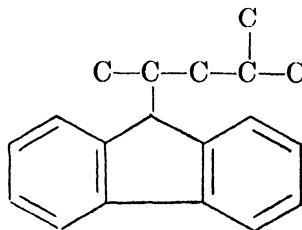
2-Methyl-2-(9'-fluoryl)-pentane (a)



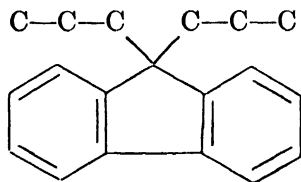
M. P., °C
84-85^{6, 7}

(a) The structure of this compound was not clearly defined in the literature.

2-Methyl-4-(9'-fluoryl)-pentane



M. P., °C
101-103¹⁸

9,9-Di-*n*-propylfluorene

M. P., °C

37-38³

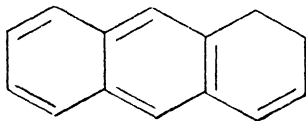
*References on $C_{14}H_{12}$ through $C_{19}H_{22}$
Compounds*

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5. DIHYDROANTHRACENES, DIHYDROPHENANTHRENES,
AND THEIR ALKYL DERIVATIVES, C_nH_{2n-16}

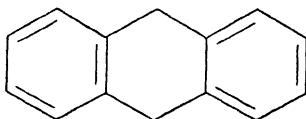


1,2-Dihydroanthracene



M. P., °C
150⁷⁹

9,10-Dihydroanthracene



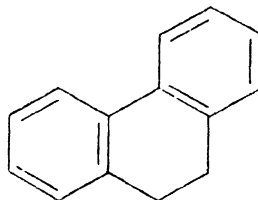
M. P., °C
108
111¹⁸
108–110¹⁵
108.0–109.8⁵⁸
108–109²⁷
107–109⁷¹
108.5^{9, 52, 71, 82}
108 (a)
107–108^{37, 45, 48}
106–108⁶³
107^{43, 74, 80}
106–107¹⁴
106–106.5⁶²
106^{25, 26, 66}
105¹⁰
104–105^{53, 61}

B. P., °C @ 760mm
315⁸²
313⁴³
305²⁵
302–303²⁶
165–170

D_4^{20} 0.88951 10.3°⁶²

(a) The melting point 108 is found in references 32, 40, 41, 47, 49, 70, 75, 80, 81.

9,10-Dihydrophenanthrene



M. P., °C
96⁷⁸
94–95^{68, 69}
94^{31, 60}
35⁴
34.5–35⁶⁵
33.8–34.4¹⁹
32–33²²

B. P., °C @ 760mm
314³¹
312–314 740⁶⁸
312–314 739⁶⁹
212–213 60¹²
176–178 20¹⁹
158 11⁶⁵
154 7.5²²
140–142 6¹⁹

D_4^{20} 1.0940 24.5°⁷⁸
1.0942 24.5°⁷⁸

n_D^{20} 1.6406 25°¹⁹
1.62093 $n_{H\alpha}^{24.5}$ ⁷⁸
1.62128 $n_{H\alpha}^{24.5}$ ⁷⁸
1.65269 $n_{H\beta}^{24.5}$ ⁷⁸
1.65312 $n_{H\beta}^{24.5}$ ⁷⁸
1.62979 $n_{He}^{24.5}$ ⁷⁸
1.63015 $n_{He}^{24.5}$ ⁷⁸

x,x-Dihydrophenanthrene (a)

M. P., °C
34.5–35⁷²

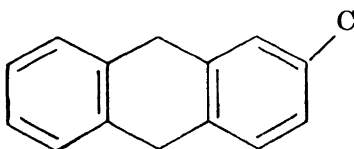
B. P., °C @ 760mm

168–170 15⁶⁷168–169 15⁷² D_4^{20} 1.0757 40° ⁷²1.0953 14° ⁷²

(a) The structure of this compound was not clearly defined in the literature.

 $C_{15}H_{14}$

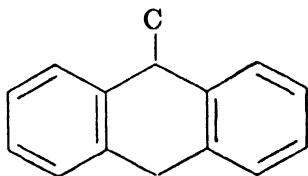
2-Methyl-9,10-dihydroanthracene



M. P., °C

51²³

9-Methyl-9,10-dihydroanthracene



M. P., °C

61.5–62⁷⁸

1-Methyl-x,x-dihydroanthracene (a)

M. P., °C

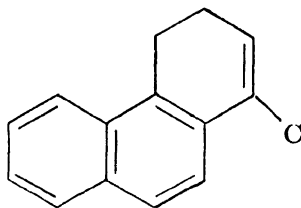
30²⁴

B. P., °C @ 760mm

314–315 740²⁴

(a) The structure of this compound was not clearly defined in the literature.

1-Methyl-3,4-dihydrophenanthrene



M. P., °C

86.0–86.5⁵ $C_{16}H_{16}$

9-Ethyl-x,x-dihydroanthracene (a)

B. P., °C @ 760mm

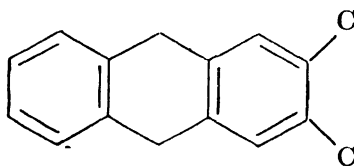
320–323⁴⁵320⁴⁶ D_4^{20}

1.049

 $D_{18}^{18, 45, 46}$

(a) The structure of this compound was not clearly defined in the literature.

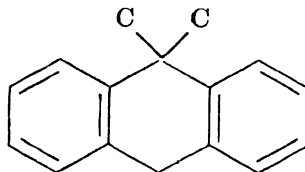
2,3-Dimethyl-9,10-dihydroanthracene



M. P., °C

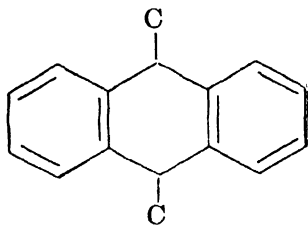
122⁸

9,9-Dimethyl-9,10-dihydroanthracene



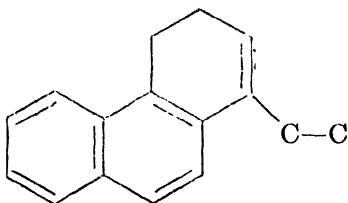
M. P., °C

56²⁸

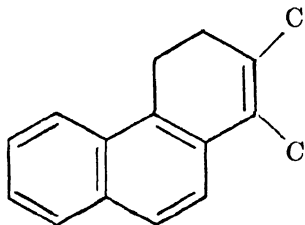
9,10-Dimethyl-9,10-dihydroanthracene

M. P., °C

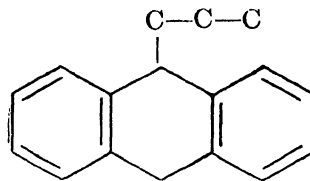
181

181-182³181-181.5²181¹⁶179-181¹⁷178-179^{1, 11}**1-Ethyl-3,4-dihydrophenanthrene**

M. P., °C

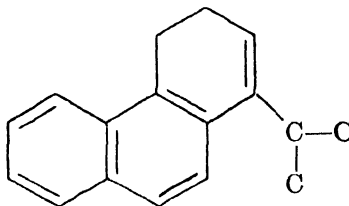
42-43⁵**1,2-Dimethyl-3,4-dihydrophenanthrene**

M. P., °C

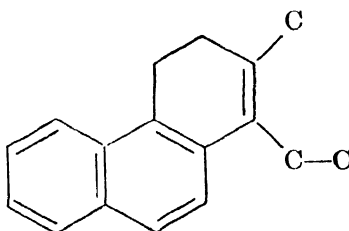
99-100³⁰C₁₇H₁₈**9-n-Propyl-9,10-dihydroanthracene**

B. P., °C @ 760mm

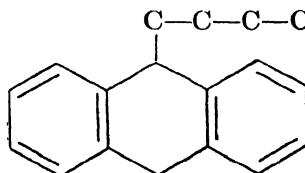
175-176

11⁷³**1-Isopropyl-3,4-dihydrophenanthrene**

M. P., °C

66-67⁵**1-Ethyl-2-methyl-3,4-dihydrophenanthrene**

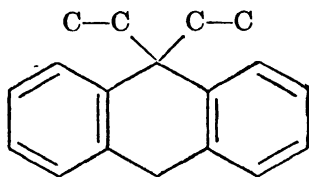
M. P., °C

77-78³⁰C₁₈H₂₀**9-n-Butyl-9,10-dihydroanthracene**

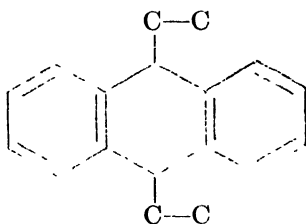
B. P., °C @ 760mm

191-192

11⁷³

9,9-Diethyl-9,10-dihydroanthracene

M. P., °C
210³⁶

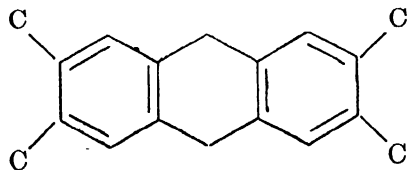
9,10-Diethyl-9,10-dihydroanthracene

D_4^{20}
1.014⁶⁴
1.0132 21° 44

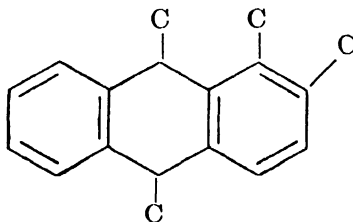
x,x-Diethyl-x,x-dihydroanthracene (a)

D_4^{20}
0.9634 100° 21
0.9949 50° 21
1.0264 0° 21

(a) The structure of this compound was not clearly defined in the literature.

2,3,6,7-Tetramethyl-9,10-dihydroanthracene

B. P., °C @ 760mm
217-219⁵⁴

1,2,9,10-Tetramethyl-9,10-dihydroanthracene

M. P., °C
100-101⁷

1,3,5,7-Tetramethyl-x,x-dihydroanthracene (a)

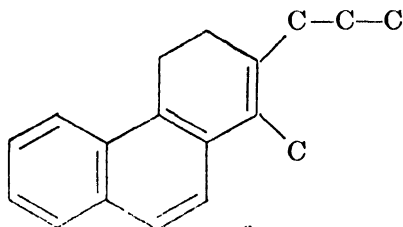
M. P., °C
132-133⁸³

(a) The structure of this compound was not clearly defined in the literature.

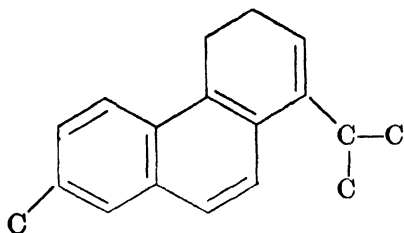
x₁-Tetramethyl-x,x-dihydroanthracene (a)

M. P., °C
171-171.5³
170.5-171²

(a) The structure of this compound was not clearly defined in the literature.

1-Methyl-2-n-propyl-3,4-dihydrophenanthrene

B. P., °C @ 760mm
208-210 13³⁹

1-Isopropyl-7-methyl-3,4-dihydro-phenanthrene


B. P., °C @ 760mm

150

2⁵⁹
1-Methyl-7-isopropyl-x,x-dihydro-phenanthrene (a)

M. P., °C

64-65^{33, 55, 76}

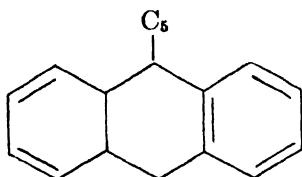
B. P., °C @ 760mm

375-376⁵⁷

188-190

10⁷⁸D₄²⁰1.027⁵⁷

(a) The structure of this compound was not clearly defined in the literature.

C₁₉H₂₂
9-Isopentyl-9,10-dihydroanthracene


B. P., °C @ 760mm

200

23⁷⁷

201-205

17⁷⁷D₄²⁰1.016⁷⁷1.025⁷⁷

1.0022

45.1°⁷⁷

0.9940

44.4°⁷⁷n_D²⁰1.5736⁷⁷1.5771⁷⁷

1.56584

45.1°⁷⁷

1.56261

44.4°⁷⁷

1.56091

n_{Hα}^{45.1 77}

1.55791

n_{Hα}^{44.4 77}

1.58047

n_{Hβ}^{45.1 77}

1.57651

n_{Hβ}^{44.4 77}

1.58868

n_{Hγ}^{44.4 77}
x-Pentyl-x,x-dihydroanthracene (a)

B. P., °C @ 760mm

350⁴⁶

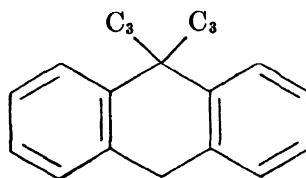
291-292

570⁴⁶D₄²⁰

1.031

18°⁴⁶

(a) The structure of this compound was not clearly defined in the literature.

C₂₀H₂₄
9,9-Dipropyl-9,10-dihydroanthracene


M. P., °C

46-47²⁹
x,x-Diisopropyl-9,10-dihydroanthracene (a)

M. P., °C

90²⁰

(a) The structure of this compound was not clearly defined in the literature.

1-Methyl-4-ethyl-7-isopropyl-x,x-dihydrophenanthrene (a)

M. P., °C

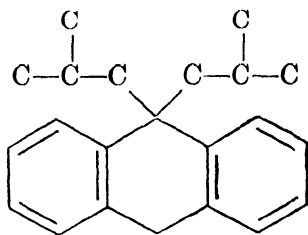
51-52.5⁵⁵51-52⁵⁵51⁵⁶

B. P., °C @ 760mm

223-225

7.5⁵⁶

(a) The structure of this compound was not clearly defined in the literature.

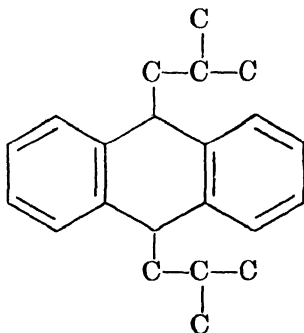
 $C_{22}H_{28}$ **9,9-Diisobutyl-9,10-dihydroanthracene**

M. P., °C

97-98⁵⁰

B. P., °C @ 760mm

140-143

0.01⁵⁰ n_D^{20} 1.5595⁵⁰**9,10-Diisobutyl-9,10-dihydroanthracene**

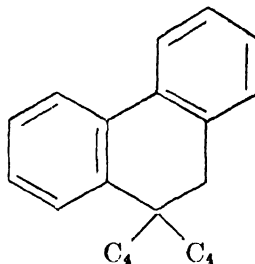
B. P., °C @ 760mm

142

0.5⁴² D_4^{20} 0.9899⁴²0.9902⁵¹ n_D^{20} 1.56336⁴²

1.55830

1.57600

 $n_{H\alpha}^{20\ 42}$ $n_{H\beta}^{20\ 42}$ **9,9-Dibutyl-9,10-dihydrophenanthrene**

M. P., °C

76¹³**x,x-Diisobutyl-x,x-dihydrophenanthrene (a)** D_4^{20}

0.9305

23°³⁴

(a) The structure of this compound was not clearly defined in the literature.

1-Methyl-x,x-diethyl-7-isopropyl-x,x-dihydrophenanthrene (a)

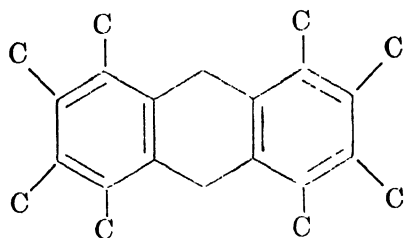
B. P., °C @ 760mm

238-241

9⁵⁵ D_4^{20} 1.0055⁵⁵

(a) The structure of this compound was not clearly defined in the literature.

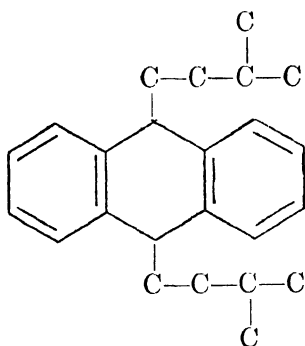
1,2,3,4,5,6,7,8-Octamethyl-9,10-dihydroanthracene



M. P., °C
283–284⁶

C₂₄H₃₂

9,10-Di-(3'-methylbutyl)-9,10-dihydroanthracene

 D_4^{20}

0.9720

0.972⁸⁴

0.9130

100°²¹

0.9499

50°²¹

0.9713

21°³⁵

0.9868

0°³⁵ n_D^{20}

1.5640

25°⁶⁴

1.5670

10°³⁵

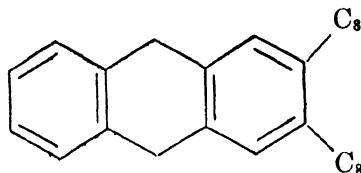
Additional Data

$$\frac{dD}{dt} = -0.0007380/^\circ\text{C}$$

(0 to 100 °C)

C₃₀H₄₄

2,3-Dioctyl-9,10-dihydroanthracene

 D_4^{20} 0.948⁶⁴

0.9016

100°²¹

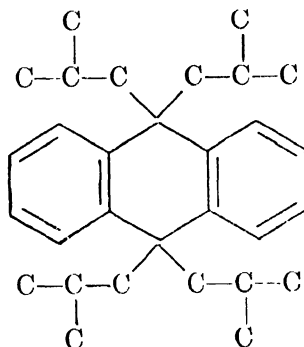
0.9331

50°²¹

0.9646

0°²¹

9,9,10,10-Tetraisobutyl-9,10-dihydroanthracene



M. P., °C

177.5⁴² n_D^{20}

1.518 (a)

 $n_{H\alpha}^{50}$

1.603 (a)

 $n_{H\gamma}^{50}$

(a) The temperature of this determination was not given.

C₃₄H₅₂

x-Tetraisoamyl-x,x-dihydroanthracene (a)

M. P., °C

168–170³³

(a) The structure of this compound was not clearly defined in the literature.

References on Dihydroanthracenes, Dihydrophenanthrenes, and Their Alkyl Derivatives

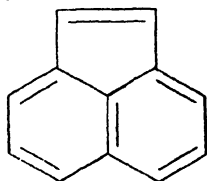
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6. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-10}



Acenaphthylene



M. P., °C

93

93-94³⁰

93^{14, 29}

92-93 (a)

92^{31, 44}

B. P., °C @ 760mm

270⁴⁴

236²⁷

175.5-176.5³⁵

D₄²⁰

0.88469

15.05°⁵⁸

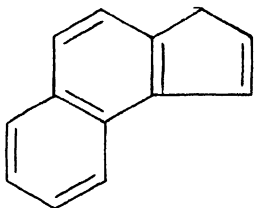
Additional Data

Sublimation Temp. (°C) **86.5°³⁸**

(a) The melting point 92-93 is found in references 5, 6, 9, 13, 32, 33, 52, 55, 56.



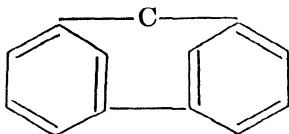
4,5-Benzoindene



M. P., °C
48.5–50⁴⁹

B. P., °C @ 760mm
173 33⁴⁹

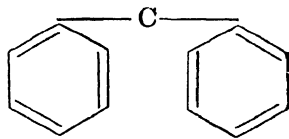
3,3'-Diphenylenemethane



M. P., °C
118¹⁵

B. P., °C @ 760mm
295¹⁵

4,4'-Diphenylenemethane

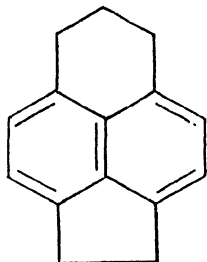


M. P., °C
208^{15, 54}

B. P., °C @ 760mm
320⁵⁴

$C_{15}H_{14}$

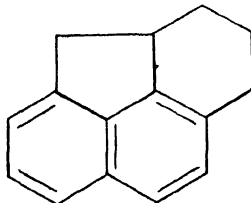
Cyclopentano-[gh]-phenalan



M. P., °C
122¹²

B. P., °C @ 760mm
168–170 1–3¹²

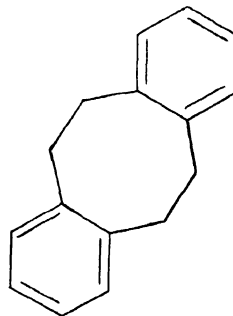
Cyclopentano-[def]-1,2,3,4-tetra- hydrophenanthrene



M. P., °C
54.5–55.5¹

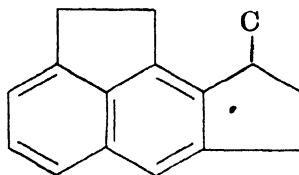
$C_{16}H_{16}$

1,2,5,6-Dibenzocyclooctane



M. P., °C
108.5³

3,4-(3'-Methylcyclopentano)-ace- naphthene

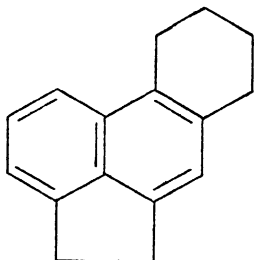


M. P., °C

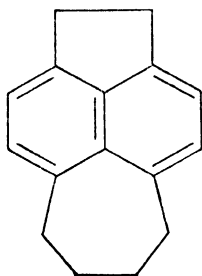
38–38.5³⁴

B. P., °C @ 760mm

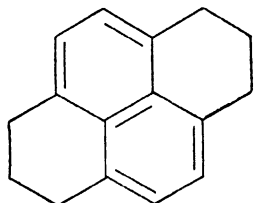
143–148

1³⁴**Cyclopentano-[jk]-1,2,3,4-tetrahydrophenanthrene**

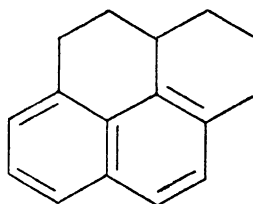
M. P., °C

92.5³⁷**Cycloheptano-[fg]-acenaphthene**

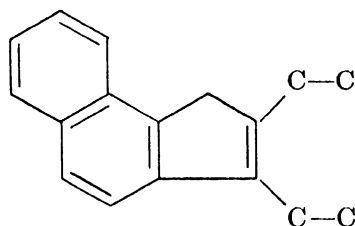
M. P., °C

138³⁶**1,2,3,6,7,8-Hexahydropyrene**

M. P., °C

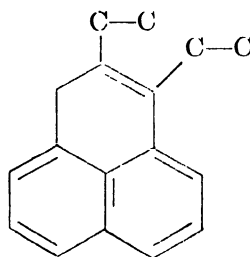
133⁴¹131–132⁴⁷129–130⁵¹129⁵⁷127^{43, 45}**1,2,3,9,10,10a-Hexahydropyrene**

M. P., °C

106²⁶105–105.5²²C₁₇H₁₈**2,3-Diethyl-6,7-benzoindene**

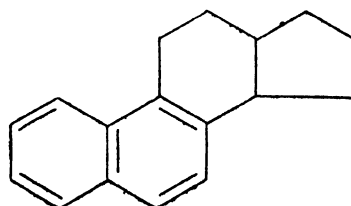
B. P., °C @ 760mm

205–207

16⁵³**2,3-Diethylphenalene**

B. P., °C @ 760mm

185

13⁵³**1,2-Cyclopentano-1,2,3,4-tetrahydrophenanthrene**

M. P., °C

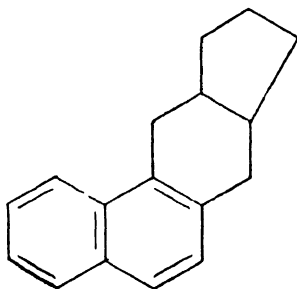
133–134.5²⁰

B. P., °C @ 760mm

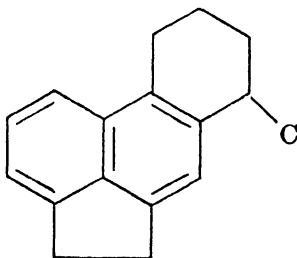
160–161 (a)

3–4²⁰ D_4^{20} 1.0859 (a)²⁰ n_D^{20}

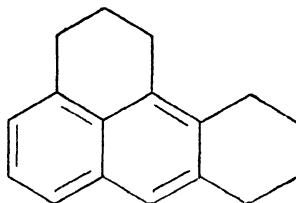
1.6256 (a)

20.2°²⁰(a) This constant was determined on the *trans* isomer of the compound.**2,3-Cyclopentano-1,2,3,4-tetrahydrophenanthrene**

M. P., °C

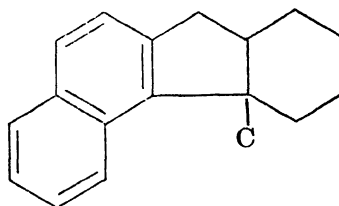
119–121⁸**Cyclopentano-[jk]-1-methyl-1,2,3,4-tetrahydrophenanthrene**

M. P., °C

133¹⁷**4,5-Cyclohexanophenalan**

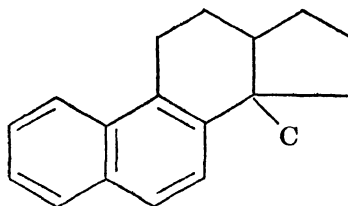
B. P., °C @ 760mm

228–230

16⁵⁹ $C_{18}H_{20}$ **4a-Methyl-5,6-benzo-1,2,3,4,4a,9a-hexahydrofluorene**

B. P., °C @ 760mm

200–205

7¹⁷**1-Methyl-1,2-cyclopentano-1,2,3,4-tetrahydrophenanthrene**

B. P., °C @ 760mm

155

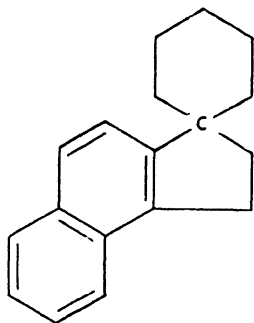
0.4⁴⁶ D_4^{20} 1.0692⁵⁰

1.04552

18.9°⁴⁶ n_D^{20} 1.6176⁵⁰

1.61363

18.9°⁴⁶**Spiro[4,5-benzoindane-1,1'-cyclohexane]**



M. P., °C

56–57¹⁶

B. P., °C @ 760mm

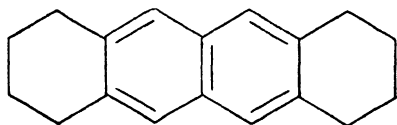
140

0.1¹⁶**x₈-Octahydro-1,2-benzoanthracene**
(a)

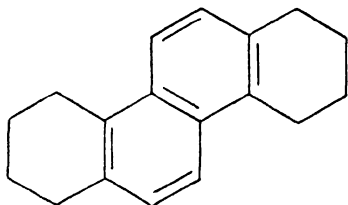
M. P., °C

124.5–125.5²⁴

(a) The structure of this compound was not clearly defined in the literature.

1,2,3,4,7,8,9,10-Octahydronaphthalene

M. P., °C

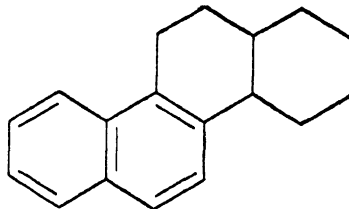
174⁶⁰**1,2,3,4,7,8,9,10-Octahydrochrysene**

M. P., °C

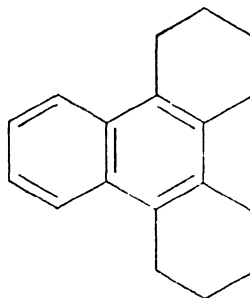
138–140⁶¹136–138¹⁶

B. P., °C @ 760mm

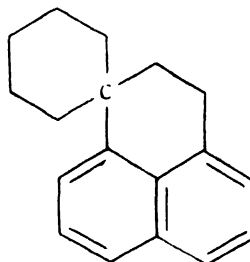
180–181

0.2⁶¹**1,2,3,4,4a,11,12,12a-Octahydrochrysene**

M. P., °C

114–114.5 (a)²¹78–79 (b)²¹(a) This constant was determined on the *trans* isomer of the compound.(b) This constant was determined on the *cis* isomer of the compound.**1,2,3,4,5,6,7,8-Octahydrotriphenylene**

M. P., °C

117.5–119.5²**Spiro[phenalan-1,1'-cyclohexane]**

M. P., °C

55–56²¹

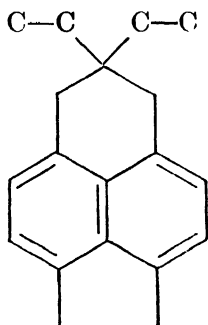
B. P., °C @ 760mm

176–177²¹ D_4^{20}

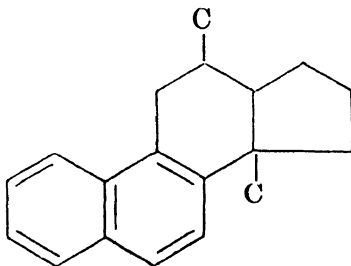
1.0809

23.5°²¹ n_D^{20}

1.6197

23.6°²¹C₁₉H₂₂Cyclopentano-[gh]-2,2-diethyl-
phenalan

M. P., °C

93–95^{39, 40}1,2-Cyclopentano-1,3-dimethyl-
1,2,3,4-tetrahydrophenanthrene

B. P., °C @ 760mm

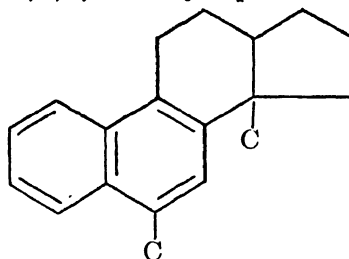
160

C.4⁴⁶ D_4^{20}

1.04203

18.2°⁴⁶ n_D^{20}

1.60681

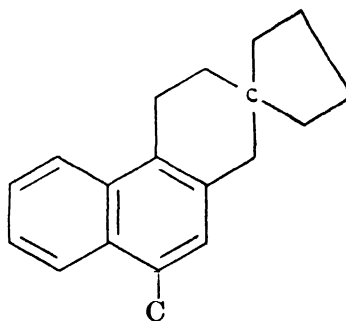
18.2°⁴⁶1,2-Cyclopentano-1,9-dimethyl-
1,2,3,4-tetrahydrophenanthrene

B. P., °C @ 760mm

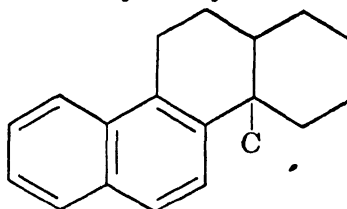
160

0.5⁴²Spiro[x-methyl-5,6-benzoindane-
1,1'-cyclohexane] (a)

M. P., °C

109–110²³(a) The structure of this compound
was not clearly defined in the
literature.Spiro[9-methyl-1,2,3,4-tetrahydro-
phenanthrene-2,1'-cyclopentane]

M. P., °C

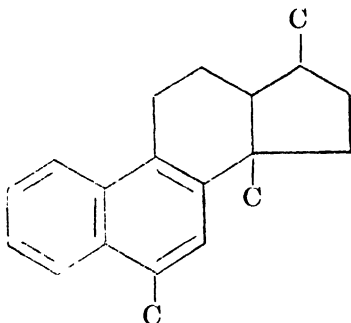
69–70⁵⁸4a-Methyl-1,2,3,4,4a,11,12,12a-
octahydrochrysene

B. P., °C @ 760mm

145

0.1¹⁹C₂₀H₂₄

1,2-(3'-Methylcyclopentano)-1,9-dimethyl-1,2,3,4-tetrahydro-phenanthrene

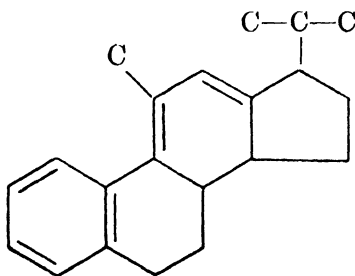


B. P., °C @ 760mm

170

0.6⁴²C₂₁H₂₆

1,2-(3'-Isopropylcyclopentano)-4-methyl-1,9,10,10a-tetrahydro-phenanthrene

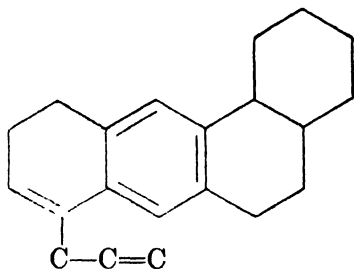


B. P., °C @ 760mm

190

0.1¹⁰

1,2-Cyclohexano-5-(propen-2'-yl)-1,2,3,4,7,8-hexahydroanthracene

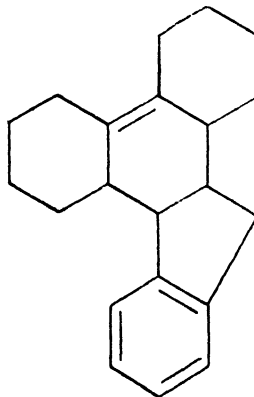


B. P., °C @ 760mm

174

0.1¹⁸

9,10-(1',2'-Indano)-1,2,3,4,5,6,7,8,8a,9,10,10a-dodecahydro-phenanthrene



B. P., °C @ 760mm

185-190 (a)⁷180-185 (a)⁷

(a) These constants were determined on isomeric forms.

C₂₂H₂₈x-Methyl-x-isopropyl-x₈-octahydro-chrysene (a)

M. P., °C

108²⁵

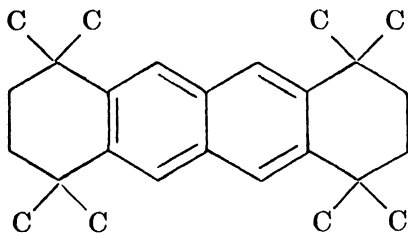
(a) The structure of this compound was not clearly defined in the literature.

x₁₄-Tetradecahydropicene (a)

M. P., °C

285⁴

- (a) The structure of this compound was not clearly defined in the literature.

 $C_{26}H_{36}$ **1,1,4,4,7,7,10,10-Octamethyl-1,2,3,4,7,8,9,10-octahydronaphthalene**

M. P., °C

319-320¹¹ $C_{33}H_{50}$ **3-Phenyl-5-cholestene (a)**

M. P., °C

152⁴⁸

- (a) The structure of this compound was not clearly defined in the literature.

Phenylcholestane (a)

M. P., °C

153⁴⁸

- (a) The structure of this compound was not clearly defined in the literature.

 $C_{35}H_{54}$ **3-Phenylcholestene-3 (a)**

M. P., °C

94-95²⁸

- (a) The structure of this compound

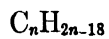
was not clearly defined in the literature.

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VI. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA

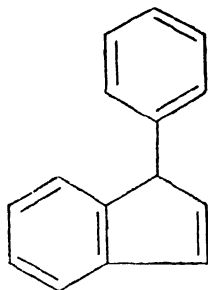


1. Indene with One Phenyl Substitution
2. Anthracene and Its Alkyl Derivatives
3. Phenanthrene and Its Alkyl Derivatives
4. Miscellaneous Polynuclear Aromatics of Empirical Formula $\text{C}_n\text{H}_{2n-18}$

1. INDENE WITH ONE PHENYL SUBSTITUTION, C_nH_{2n-18}

$C_{16}H_{12}$

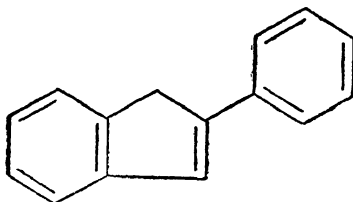
1-Phenylindene



B. P., °C @ 760mm
200–201 29¹⁹

D_4^{20}
1.0829 27° 19

2-Phenylindene



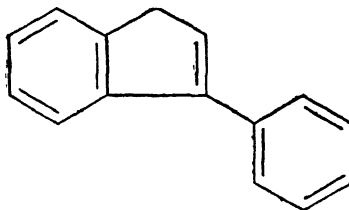
M. P., °C
167²⁰
166–167°

B. P., °C @ 760mm
167–170 12¹⁵
162–163 10²⁰

D_4^{20}
1.0821 16° 20

n_D^{20}
1.5955 16° 20

3-Phenylindene



B. P., °C @ 760mm
164–167 12°
167–171 10°

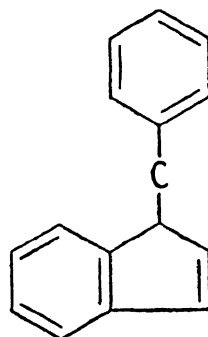
x-Phenylindene (a)

B. P., °C @ 760mm
183–187 17°

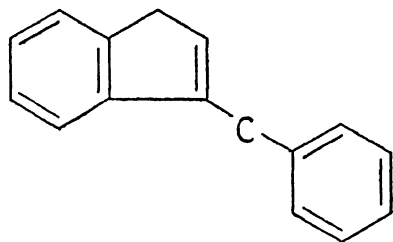
(a) The structure of this compound was not clearly defined in the literature.

$C_{16}H_{14}$

1-Benzy lindene



B. P., °C @ 760mm
230–235 15¹⁴
175–177 14°
173–175 12°

3-Benzylindene

M. P., °C

35²²31^{9, 10}33-34²¹

B. P., °C @ 760mm

185

18²¹

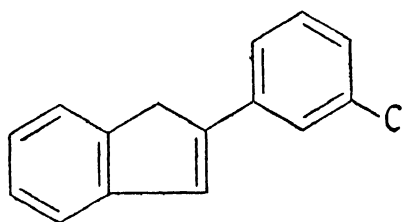
175-177

14¹⁰

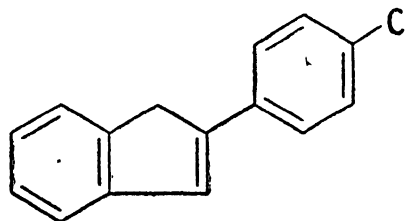
183-185

13¹⁷

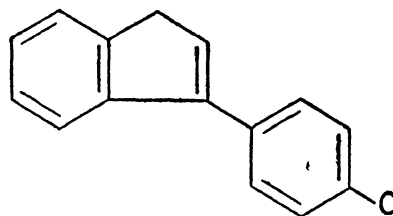
179

11²²**2-m-Tolylindene**

M. P., °C

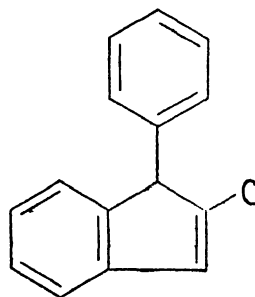
99-100²⁰**2-p-Tolylindene**

M. P., °C

183-184²⁰**3-p-Tolylindene**

B. P., °C @ 760mm

184-188

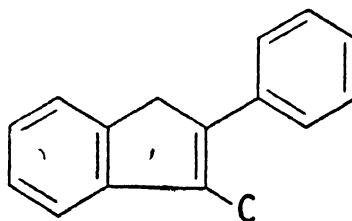
11²⁰**1-Phenyl-2-methylindene**

M. P., °C

57.5¹⁵56.5²³

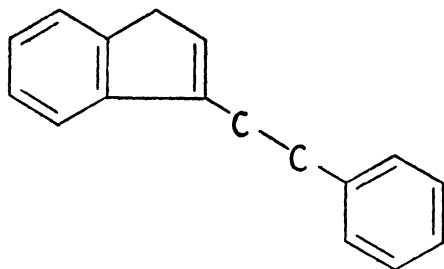
B. P., °C @ 760mm

177

14¹⁵**2-Phenyl-3-methylindene**

M. P., °C

76-78⁶75-76¹ $C_{17}H_{16}$ **3-Phenethylindene**



B. P., °C @ 760mm

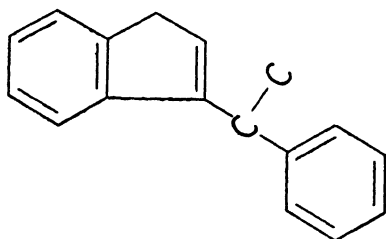
186

9⁷ n_D^{20}

1.5987

18.7° 7

(3-Indenyl)-phenylmethane



B. P., °C @ 760mm

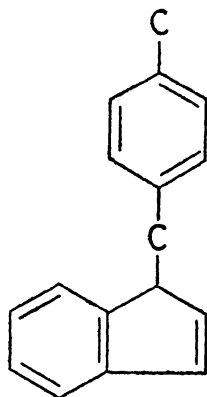
196

15¹⁸

161

5¹⁸

1-(4'-Methylbenzyl)-indene



M. P., °C

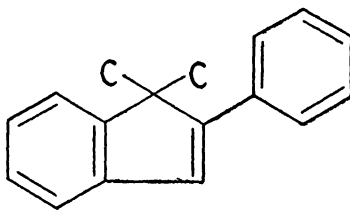
27-29³

B. P., °C @ 760mm

218-222

12³

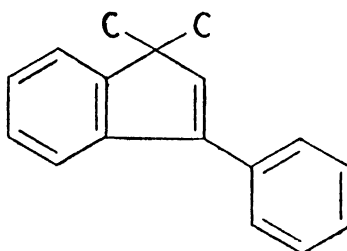
1,1-Dimethyl-2-phenylindene



M. P., °C

61-62¹²51¹¹

1,1-Dimethyl-3-phenylindene



M. P., °C

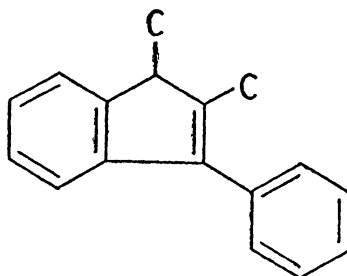
50-51^{2, 13}

B. P., °C @ 760mm

184-185

27¹³

1,2-Dimethyl-3-phenylindene



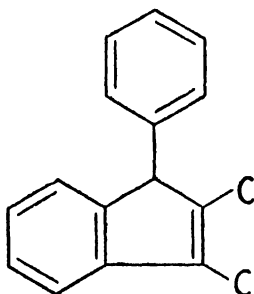
M. P., °C

68-69¹⁶

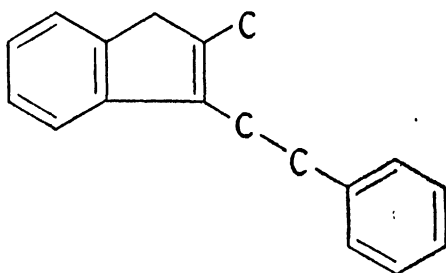
B. P., °C @ 760mm

145-153

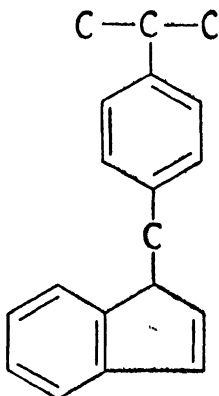
4¹⁶

1-Phenyl-2,3-dimethylindene

M. P., °C
68–69¹³

C₁₈H₁₈**2-Methyl-3-phenethylindene**

B. P., °C @ 760mm
170 1⁸

C₁₉H₂₀**1-(4'-Isopropylbenzyl)-indene**

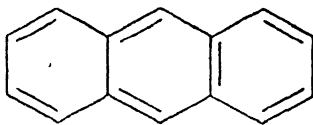
M. P., °C
32³

*References on Indene with One Phenyl
Substitution*

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2. ANTHRACENE AND ITS ALKYL DERIVATIVES, C_nH_{2n-18} 

Anthracene



M. P., °C

216.6

219^{147, 148, 149}218^{18, 23, 67, 136}217.6¹⁴⁶217-217.5⁹⁵

217 (a)

216-217^{57, 66}216-216.8¹⁴⁰216.4-216.7^{14, 15}216.6¹⁰⁴216.55¹¹⁶216.5^{28, 97, 112, 113}216.0-216.5¹¹⁷216-216.5⁹⁴216.4¹⁰³216.18⁹²216.1¹²⁸216.0²⁶

216 (b)

B. P., °C @ 760mm

341.4

342.0¹⁰⁴342¹¹⁴340.36⁴⁴340⁶⁷339.9^{26, 92, 128}339.87⁴⁴339.77²⁵343.25 778.2¹⁰⁶342.05 761.2¹⁰⁶341.70 757.3¹⁰⁶341.57 756.4¹⁰⁶340.6 742.2¹⁰⁴340.5 742.2¹⁰⁴

340.58

337.70

337.14

335.52

329.47

328.0

327.9

327.4

325.47

321.29

320

318.20

313.4

313.2

312.8

310.31

304.35

300.6

300

300.1

299.9

298.22

297.38

295.37

292.15

286.66

282.1

282.0

280

277.50

277.66

271.75

270.70

263.74

261.76

260.3

259.50

260

259.8

259.4

254.86

244.6

738.9¹⁰⁶697.6¹⁰⁶692.7¹⁰⁶674.4¹⁰⁶612.2¹⁰⁶584.0¹⁰⁴583.4¹⁰⁴577.4¹⁰⁴555.5¹⁰⁶515.0¹⁰⁶502.9³⁶488.1¹⁰⁶437.0¹⁰⁴436.2¹⁰⁴432.9¹⁰⁴415.6¹⁰⁶363.9¹⁰⁶334.2¹⁰⁴332.0³⁶331.3¹⁰⁴330.4¹⁰⁴319.1¹⁰⁶317.7¹⁰⁶303.0¹⁰⁶279.0¹⁰⁶247.7¹⁰⁶219.8¹⁰⁴219.6¹⁰⁴211.0³⁶203.2¹⁰⁶198.2¹⁰⁶175¹⁰⁶169.3¹⁰⁶142.5¹⁰⁶135.5¹⁰⁶130.2¹⁰⁴129.5¹⁰⁶129.1³⁶128.3¹⁰⁴127.3¹⁰⁴113.4¹⁰⁶86.5¹⁰⁴

244.59	86.5 ¹⁰⁶
244.4	85.9 ¹⁰⁴
240	76.0 ³⁸
236.64	69.6 ¹⁰⁶
232.12	62.1 ¹⁰⁶
231.94	60.2 ¹⁰⁶
228.0	55.0 ¹⁰⁴
227.77	52.7 ¹⁰⁶
226.53	52.7 ¹⁰⁶
223.2	48.0 ¹⁰⁴

 D_4^{20} 1.242 (solid)¹²⁰1.244 (solid)¹⁰⁵1.250¹⁴1.252¹⁴1.26¹²⁶0.9457 254.7°⁹²0.9456 254.3°⁹²0.9516 246.5°⁹²1.250 27°¹⁰⁹1.2477₆ 25.00°⁹⁹1.252 25°⁶⁸1.253 25°⁶⁸1.252 22°¹⁹1.251 17°¹⁴1.303 -195°¹⁹ n_D^{20} 1.59480 90.35°¹³⁵

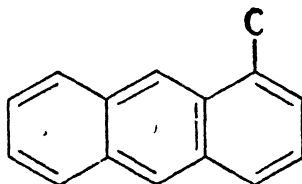
Additional Data

$$\frac{1}{T_b} = 0.0025640$$

$$- 0.0003252 \log_{10} p_{mm}$$

(100 to 780mm)

- (a) The melting point 217 is found in references 31, 56, 61, 62, 69, 118, 119, 129, 139.
- (b) The melting point 216 is found in references 17, 70, 72, 90, 91, 96, 108, 110, 111, 127.

 $C_{15}H_{12}$ **1-Methylantracene**

M. P., °C

86¹³²85-86^{47, 48, 49, 65, 77}83-85⁸⁹ D_4^{20}

1.0471

99.4°^{76, 77} n_D^{20}

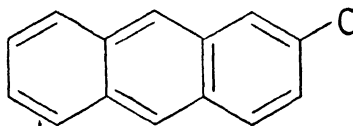
1.68027

99.4°^{76, 77}

1.66692

 $n_{H\alpha}^{99.4, 76, 77}$

1.72106

 $n_{H\beta}^{99.4, 76, 77}$ **2-Methylantracene**

M. P., °C

206.5

208-210¹³⁷209-209.5⁹⁴207-207.5⁷²

207 (a)

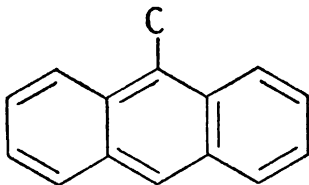
206-207¹²²205-207⁷⁵205¹⁴²204-205⁷⁴204.5⁸²204¹¹⁵203-204^{47, 55, 71}202-204^{21, 22}203^{20, 70, 98}202-203⁶⁴202^{29, 34, 115, 133, 134}

B. P., °C @ 760mm

293-297⁴⁶

- (a) The melting point 207 is found in references 35, 45, 73, 76, 87, 89, 102, 141.

9-Methylantracene



M. P., °C

81.5¹²⁵

79-80^{76, 78}

78-79⁴

76.3-77.8⁴³

D_4^{20}

1.0657

99.4°⁷⁶

n_D^{20}

1.69589

99.4°⁷⁶

1.68166

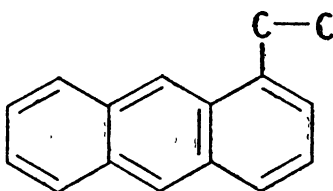
$n_{H\alpha}^{99.4\ 76}$

1.74075

$n_{H\beta}^{99.4\ 76}$



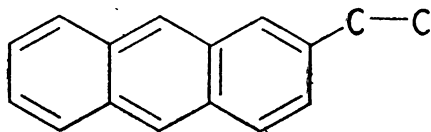
1-Ethylantracene



M. P., °C

33-34¹³⁸

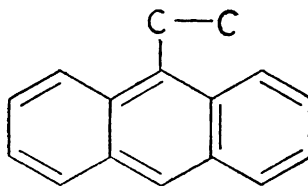
2-Ethylantracene



M. P., °C

150-151¹³⁸

9-Ethylantracene



M. P., °C

60-61^{84, 85}

59^{73, 77, 78, 125}

56-58⁴³

D_4^{20}

1.0413

99.2°^{76, 77}

n_D^{20}

1.67621

99.2°^{76, 77}

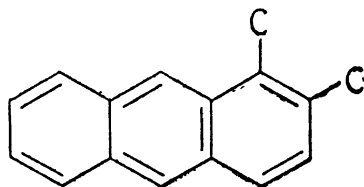
1.66282

$n_{H\alpha}^{99.2\ 76, 77}$

1.71845

$n_{H\beta}^{99.2\ 76, 77}$

1,2-Dimethylantracene



M. P., °C

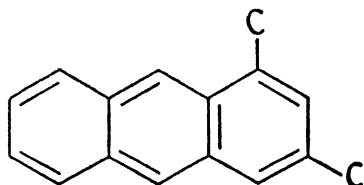
85.5-86⁷

B. P., °C @ 760mm

180

0.4⁷

1,3-Dimethylantracene



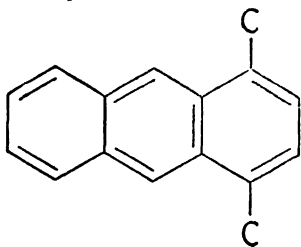
M. P., °C

204³⁸

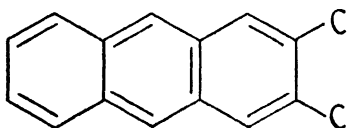
202-203^{55, 86}

202⁷¹

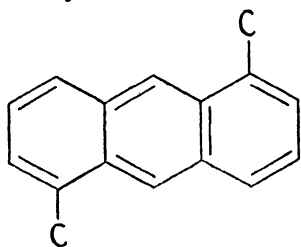
200¹³⁰

1,4-Dimethylantracene

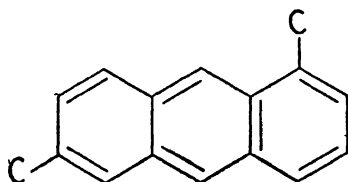
M. P., °C

76¹¹74¹³²71⁸⁸**2,3-Dimethylantracene**

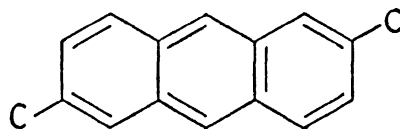
M. P., °C

252^{12, 102}246^{38, 40}244-246²⁴**1,5-Dimethylantracene**

M. P., °C

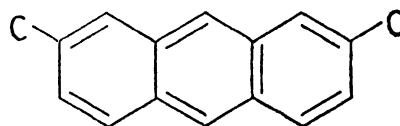
139-140⁵⁸**1,6-Dimethylantracene**

M. P., °C

240^{22, 30, 82, 83}**2,6-Dimethylantracene**

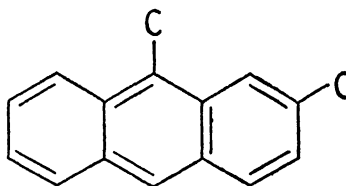
M. P., °C

245

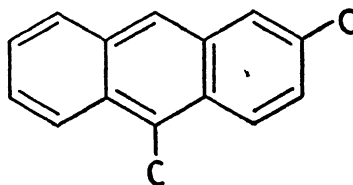
250¹⁰⁰248¹⁰²243^{6, 123}242-243⁵⁰**2,7-Dimethylantracene**

M. P., °C

242

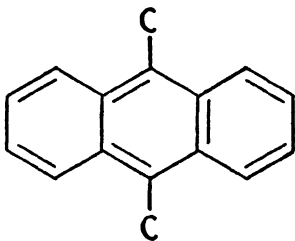
244.5^{82, 83}243-244^{2, 81}241¹⁰⁰239¹⁰²235⁷³**2,9-Dimethylantracene**

M. P., °C

85⁸**2,10-Dimethylantracene**

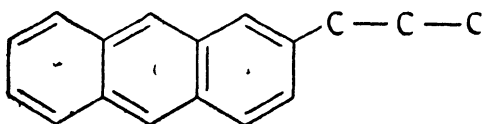
M. P., °C

85⁸

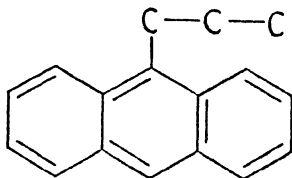
9,10-Dimethylantracene

M. P., °C

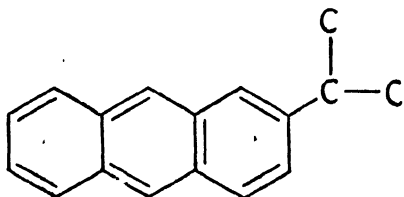
181

182.8–183.8¹⁶181–181.5⁷⁹181¹³180.5–181³180–181⁵⁴C₁₇H₁₆**2-n-Propylantracene**

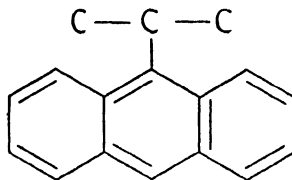
M. P., °C

126¹³⁸**9-n-Propylantracene**

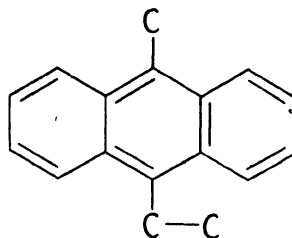
M. P., °C

69–70¹²⁵**2-Isopropylantracene**

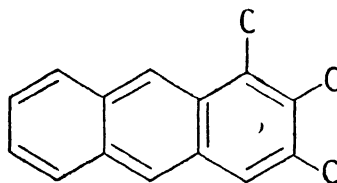
M. P., °C

154–155¹³⁸**9-Isopropylantracene**

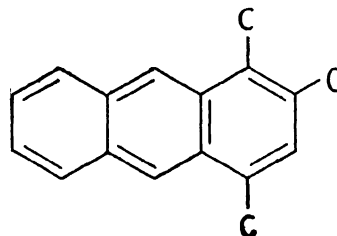
M. P., °C

76¹³**9-Methyl-10-ethylantracene**

M. P., °C

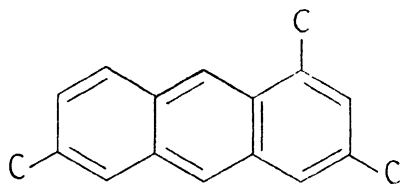
144¹⁴⁵143.2–144¹⁶143–144¹⁴⁴**1,2,3-Trimethylantracene**

M. P., °C

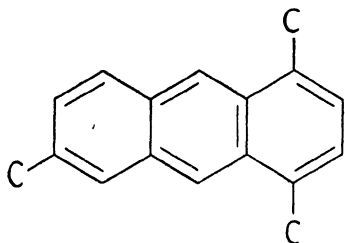
243¹⁴³236¹⁴³**1,2,4-Trimethylantracene**

M. P., °C

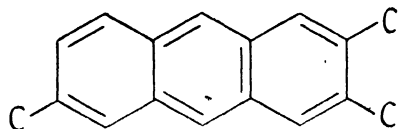
244³⁹243^{55, 102}236⁸⁸

1,3,6-Trimethylantracene

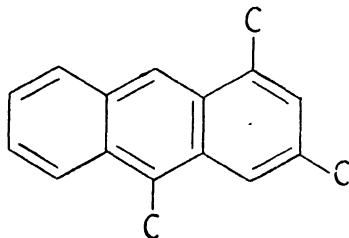
M. P., °C
222^{39, 102}

1,4,6-Trimethylantracene

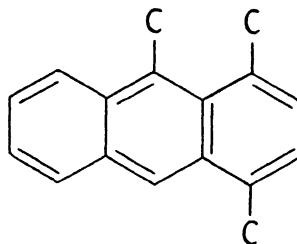
M. P., °C
227^{37, 39, 41, 102}

2,3,6-Trimethylantracene

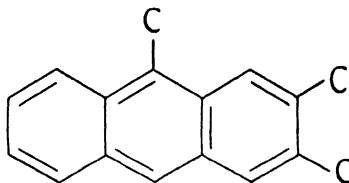
M. P., °C
255¹⁰¹
252¹⁰²

1,3,10-Trimethylantracene

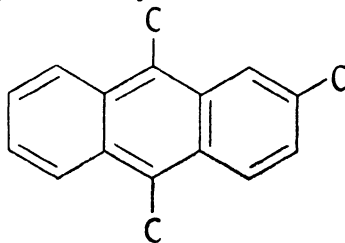
M. P., °C
100¹⁰

1,4,9-Trimethylantracene

M. P., °C
81¹¹

2,3,9-Trimethylantracene

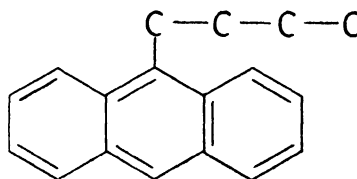
M. P., °C
125¹²

2,9,10-Trimethylantracene

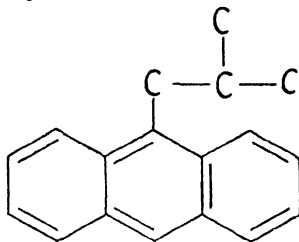
M. P., °C
100–101 (a)³
95–96 (a)³

(a) These constants were determined on different crystalline forms.

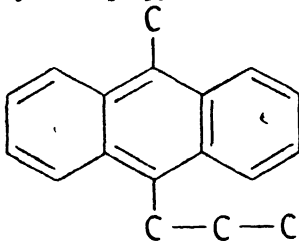
$C_{18}H_{18}$

9-*n*-Butylantracene

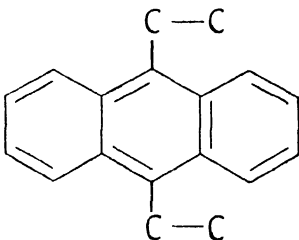
M. P., °C
57⁸⁵
49–50¹²⁵

9-Isobutylanthracene

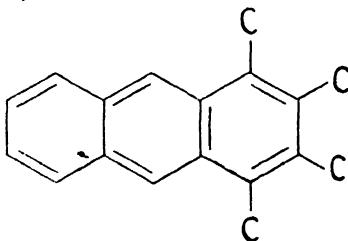
M. P., °C
57⁸⁴

9-Methyl-10-*n*-propylanthracene

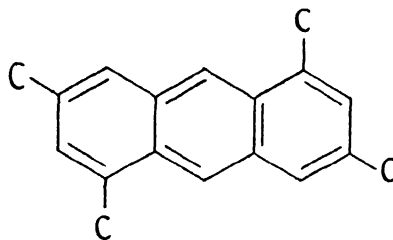
M. P., °C
97.8-98.6¹⁸

9,10-Diethylanthracene

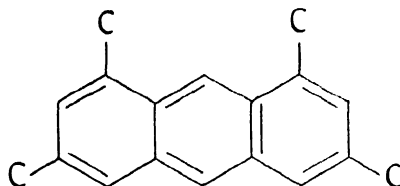
M. P., °C
146-147⁸
146¹⁰⁷
145.5⁶⁰

1,2,3,4-Tetramethylantracene

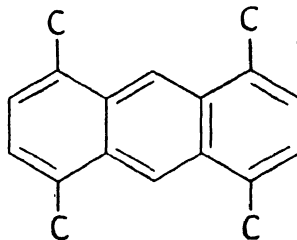
M. P., °C
135.5-136.5⁵⁹

1,3,5,7-Tetramethylantracene

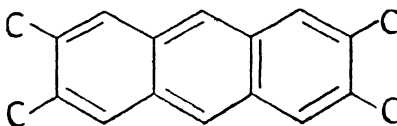
M. P., °C
163-164¹²⁴
162-163⁵²

1,3,6,8-Tetramethylantracene

M. P., °C
286-287⁵¹
281-283¹²⁴
280^{1, 32, 33}

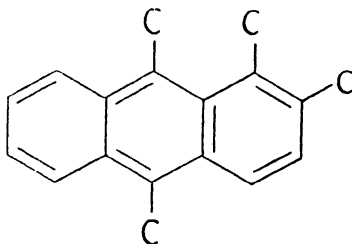
1,4,5,8-Tetramethylantracene

M. P., °C
270⁴²

2,3,6,7-Tetramethylantracene

M. P., °C
 304⁴²
 301¹⁰²
 299⁹

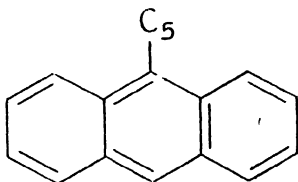
1,2,9,10-Tetramethylantracene



M. P., °C
 52–54¹²¹

$C_{19}H_{20}$

9-Pentylantracene (a)



M. P., °C
 61^{76, 78}
 59^{84, 85}
 58–59⁵³
 58¹³¹

D_4^{20}

0.9812	99.4° ⁷⁶
0.9982	76.5° ¹³¹
0.9987	74.4° ¹³¹
1.0017	71.1° ¹³¹

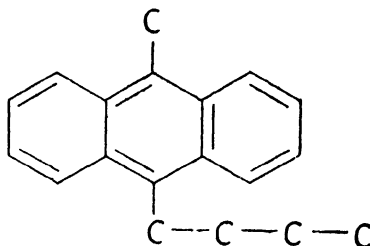
n_D^{20}

1.62529	99.4° ⁷⁶
1.63475	76.5° ¹³¹
1.63636	71.1° ¹³¹
1.61423	$n_{H\alpha}^{99.4\ 76}$
1.62353	$n_{H\alpha}^{76.5\ 131}$

1.62491	$n_{H\alpha}^{71.1\ 131}$
1.66023	$n_{H\beta}^{99.4\ 76}$
1.67008	$n_{H\beta}^{76.5\ 131}$
1.67152	$n_{H\beta}^{71.1\ 131}$

(a) This compound was named *Iso*-amylantracene in references 53, 76, 78, 131.

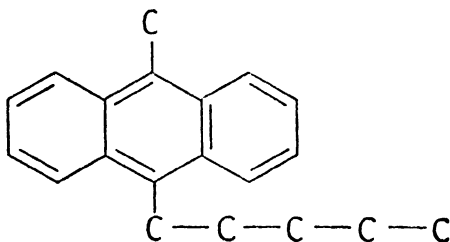
9-Methyl-10-*n*-butylantracene



M. P., °C
 78.2–78.8¹⁶

$C_{20}H_{22}$

9-Methyl-10-*n*-pentylantracene

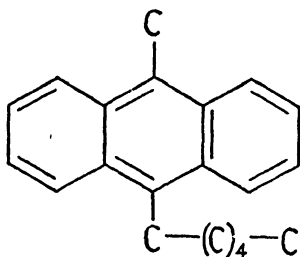


M. P., °C
 71–71.8¹⁶

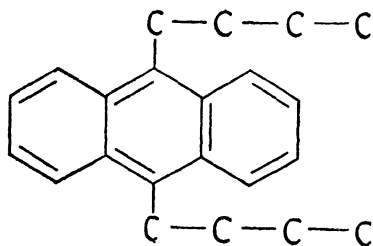
Diisopropylantracene (a)

B. P., °C @ 760mm
 202–206 0.2²⁷

(a) The structure of this compound was not clearly defined in the literature.

9-Methyl-10-*n*-hexylanthracene

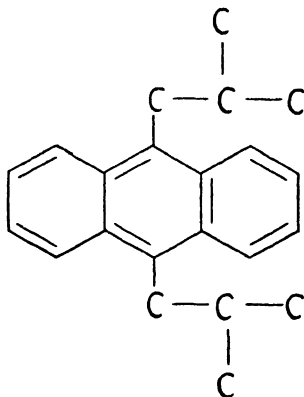
M. P., °C

65.8–66.5¹⁶9,10-Di-*n*-butylanthracene

M. P., °C

105–106⁶⁰

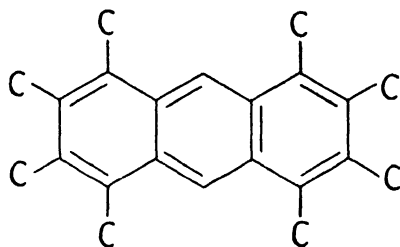
9,10-Diisobutylanthracene



M. P., °C

137–138^{80, 93}132–133^{80, 93}

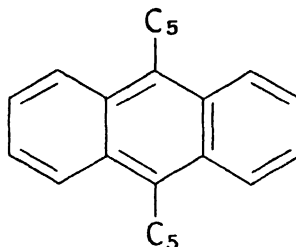
1,2,3,4,5,6,7,8-Octamethylanthracene



M. P., °C

299–300⁵

9,10-Dipentylanthracene



M. P., °C

132–137⁶³134.5–135 (a)⁶⁰(a) This compound was named *Diiso-*amylanthracene.*x,x*-Di-(ethylbutyl)-anthracene (a)

B. P., °C @ 760mm

240–256

3²⁷

(a) The structure of this compound was not clearly defined in the literature.

*x₅*-Penta-(diethylbutyl)-anthracene (a)

M. P., °C

89.2–101²⁷

(a) The structure of this compound was not clearly defined in the literature.

References on Anthracene and Its Alkyl Derivatives

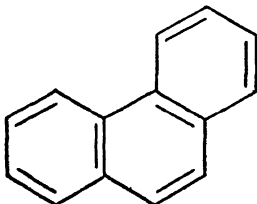
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3. PHENANTHRENE AND ITS ALKYL DERIVATIVES, C_nH_{2n-18} 

Phenanthrene



M. P., °C

100.3
103.5 ⁵⁹
103.05 ¹⁰⁵
103.0 ⁵⁹
103 ^{60, 75}
102.5–103 ⁵¹
101–102 ¹¹⁸
101 ^{17, 18, 43, 53}
100.7–101 ³²
100–101 ¹⁰⁷
100.0–100.9 ²⁴
100.5 ¹¹³
100.4 ¹¹⁹
100.35 ¹²⁶
100.3 ¹²²
100(a)
99.6–100 ⁸⁶
99.5–100 ¹³⁷
99–100(b)
99.8 ²²
99.6 ¹³²
99.5 ^{67, 101}
99–99.5 ^{23, 79}
98.8–99.5 ⁸⁹
98.7–99.5 ¹
98.5–99.5 ⁵
99.0 ⁸⁰
99 (c)
98–99 ^{55, 83, 114, 115, 124, 125}
98.8 ¹⁰⁰
98.2–98.8 ¹⁰³
98.5 ^{57, 94, 97}
98.0 ⁸²

98 ^{15, 29, 88, 133}
97.5–98 ^{35, 52}
97–98 ^{2, 19, 20, 27, 33, 72}
97.8 ⁸⁰
97.7 ⁴⁹
97–97.5 ¹³¹
96.5–97.5 ³³
97.3 ¹³
97.2 ¹⁰
96–97 ^{20, 34, 92}
96.3 ⁹⁹
96.25 ^{37, 89}
96.2 ⁷⁴
96.1 ¹²¹
96 ^{45, 56, 68, 93, 130}
95–96 ¹²⁹
95.85 ⁷³
95.57 ¹²

B. P., °C @ 760mm

339.6	
340 (d)	
338.5 ⁸²	
337.8 ⁸¹	
346.8	883.9 ⁸²
345.7	870.9 ⁸²
345.1	864.4 ⁸²
340.59	764.2 ⁸⁶
340.41	762.3 ⁸⁶
339.91	754.3 ⁸⁶
337.1	741.0 ⁸²
333.08	664.6 ⁸⁶
332.11	654.4 ⁸⁶
330	629.4 ²⁸
325.4	592.6 ⁸²
324.9	588.7 ⁸²
324.5	584.7 ⁸²
321.24	531.5 ⁸⁶
320	518.8 ²⁸
319.27	510.7 ⁸⁶
312.62	446.0 ⁸⁶
309.44	420.3 ⁸⁶
308.64	414.8 ⁸⁶
306.5	399.7 ⁸²

306.4	399.2 ⁸²
300.91	350.9 ⁸⁶
300	343.7 ²⁸
299.88	340.2 ⁸⁶
295.37	311.4 ⁸⁶
294.57	307.4 ⁸⁶
293.2	299.9 ⁸²
293.2	299.8 ⁸²
293.1	299.7 ⁸²
282.73	234.1 ⁸⁶
281.33	226.1 ⁸⁶
280	220.0 ²⁸
271.5	183.0 ⁸²
271.5	182.9 ⁸²
269.89	172.4 ⁸⁶
264.73	151.4 ⁸⁶
260	135.5 ²⁸
249.14	101.5 ⁸⁶
246.1	94.6 ⁸²
246.59	94.5 ⁸⁶
246.0	94.3 ⁸²
240	79.0 ²⁸
233.8	67.5 ⁸²
233.54	65.4 ⁸⁶
232.34	62.2 ⁸⁶
203.6	27.2 ⁸²

 D_4^{20}

1.172 (solid)⁶¹
 1.174 (solid)⁸⁴
 1.175 (solid)⁴⁷
 1.182 (solid)¹⁰⁶

1.018	170° ¹¹⁰
1.031	150° ¹¹⁰
1.030	149.8° ¹¹¹
1.0412	131.1° ⁶³
1.046	130° ¹¹⁰
1.046	129.8° ¹¹¹
1.058	110° ¹¹⁰
1.0630	100.5° ¹¹³
1.058	99.8° ¹¹¹
1.0395	97.03° ¹²
1.0418	93.53° ¹²
1.0459	89.43° ¹²
1.0483	85.93° ¹²

1.0514	81.82° ¹²
1.0540	78.32° ¹²
1.0590	71.62° ¹²
1.0620	67.53° ¹²
1.0671	60.83° ¹²
1.0688	57.33° ¹²
1.1648 (solid)	47.12° ¹²
1.1752 (solid)	28.91° ¹²
1.179	25° ⁶²
1.1816 (solid)	19.46° ¹²

 n_D^{20}

1.629	170° ¹¹⁰
1.639 ₆	150° ¹¹⁰
1.6395	149.8° ¹¹¹
1.650	130° ¹¹⁰
1.6502	129.8° ¹¹¹
1.65671	129.6° ⁶³
1.660	110° ¹¹⁰
1.6600	99.8° ¹¹¹
1.64646	$n_{H\alpha}^{130.6\ 63}$

(e)

Additional Data

$$\frac{1}{T_b} = 0.0025694 - 0.0003254 \log_{10} p_{mm}$$

(100 to 885mm)

- (a) The melting point 100 is found in references 3, 4, 11, 14, 16, 18, 21, 40, 41, 43, 44, 46, 64, 70, 77, 86, 87, 90, 95, 96, 98, 102, 108, 109, 112, 114, 115, 120, 128.
- (b) The melting point 99–100 is found in references 7, 25, 36, 50, 71, 116, 134, 136.
- (c) The melting point 99 is found in references 8, 9, 26, 31, 37, 42, 58, 69, 73, 76, 91, 104, 117, 119, 134, 135, 136.
- (d) The boiling point 340 is found in references 6, 16, 38, 54, 65, 69, 117, 123, 127, 129, 130.
- (e) Refractive indices at other lines are found in reference 85.

References on Phenanthrene

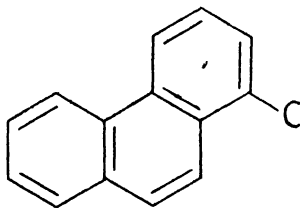
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C₁₅H₁₂

1-Methylphenanthrene

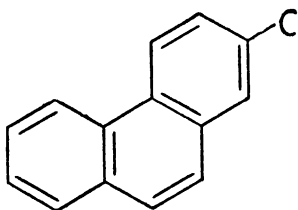


M. P., °C

121.3
 123.5⁴²
 123¹⁰⁰
 122-122.5⁵⁶
 120-121⁹
 120⁵⁴
 119-120^{28, 53}
 119^{68, 82}
 118^{57, 59}

B. P., °C @ 760mm

354-355 · 763⁸²

2-Methylphenanthrene

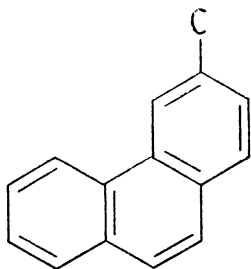
M. P., °C

55.3

56–56.5⁹⁸56⁹⁵55–56^{31, 57, 124}54–55¹¹53⁸³52–53⁷⁶

B. P., °C @ 760mm

155–160

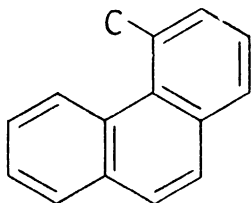
3⁹⁵**3-Methylphenanthrene**

M. P., °C

85¹²⁴65^{82, 100}62–63⁵⁷61–62⁵

B. P., °C @ 760mm

350

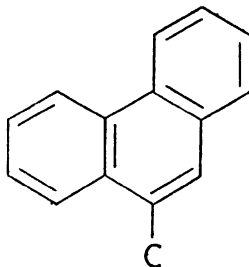
769⁸²**4-Methylphenanthrene**

M. P., °C

117¹⁰³116³⁴49–50^{57, 67}

B. P., °C @ 760mm

160

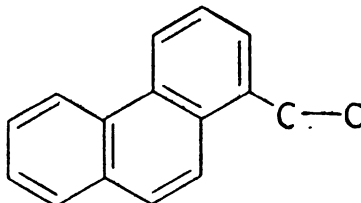
2³⁴**9-Methylphenanthrene**

M. P., °C

94

99.5¹⁷94¹⁴²91.5–92.5²⁶92⁸²91–92⁸⁶90–91^{4, 62, 84, 139}88–89¹³⁸88¹⁴⁰

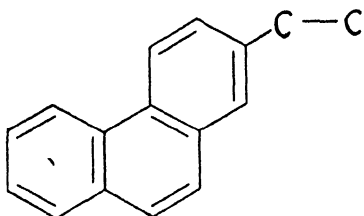
B. P., °C @ 760mm

354–355⁸² $C_{16}H_{14}$ **1-Ethylphenanthrene**

M. P., °C

109–110¹⁰¹108⁸²63.5–64.0⁹62–63⁵⁵62.5⁶⁴

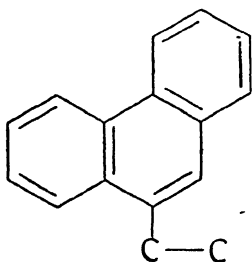
2-Ethylphenanthrene



M. P., °C

172-173¹⁰¹67-68⁹¹65-66⁶64-65⁶³

9-Ethylphenanthrene



M. P., °C

63

66¹⁶63.5-64.5³62.5-63⁹¹61-63¹⁰²61¹³⁷58-60⁸⁶

B. P., °C @ 760mm

220¹⁵

198-200

11¹⁰² D_4^{20}

1.0603

77.5°⁸¹ n_D^{20}

1.65818

77.5°⁸¹

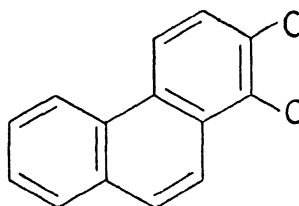
1.64834

 $n_{H\alpha}^{77.5\ 81}$

1.68588

 $n_{H\beta}^{77.5\ 81}$

1,2-Dimethylphenanthrene



M. P., °C

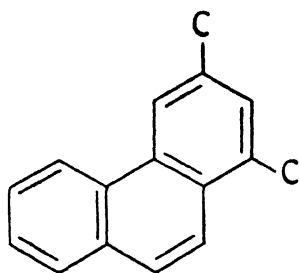
142-143⁶⁴140²⁹139-140¹³

B. P., °C @ 760mm

115-120

2¹⁸

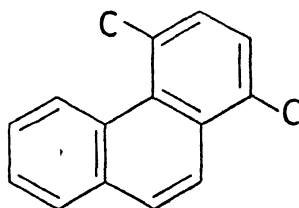
1,3-Dimethylphenanthrene



M. P., °C

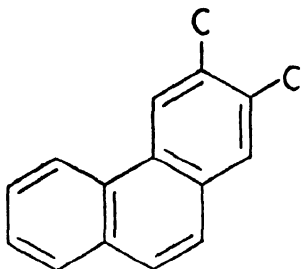
76-77²⁴75-76⁶⁴

1,4-Dimethylphenanthrene

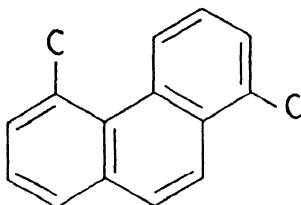


M. P., °C

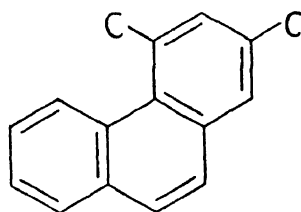
77¹¹50-51²49.5-50.0⁹⁹

2,3-Dimethylphenanthrene

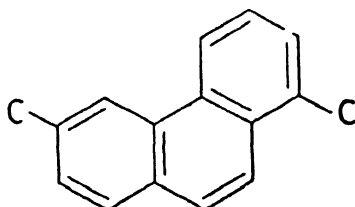
M. P., °C

79–80⁶⁵78–78.5^{48, 50}77–78⁴⁹65–66⁶⁴**1,5-Dimethylphenanthrene**

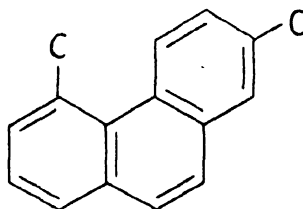
M. P., °C

57–58⁶⁴**2,4-Dimethylphenanthrene**

M. P., °C

111⁶⁴**1,6-Dimethylphenanthrene**

M. P., °C

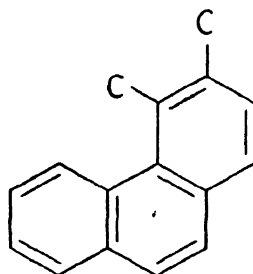
87–88⁶⁴**2,5-Dimethylphenanthrene**

M. P., °C

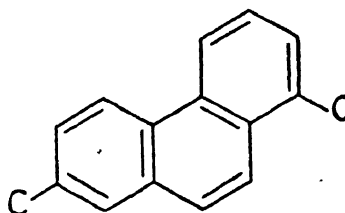
46–47⁶⁴

B. P., °C @ 760mm

204–205

15⁶⁴**3,4-Dimethylphenanthrene**

M. P., °C

62–63⁶⁴**1,7-Dimethylphenanthrene
(Pimanthrene)**

M. P., °C

85.7

86^{11, 27, 114, 119, 120}85–86^{23, 61, 106}85⁷⁸79–81⁷⁰45⁸⁸

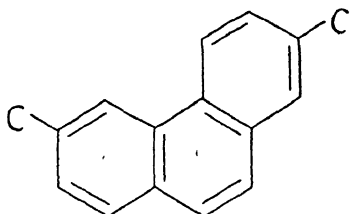
B. P., °C @ 760mm

340⁸⁸

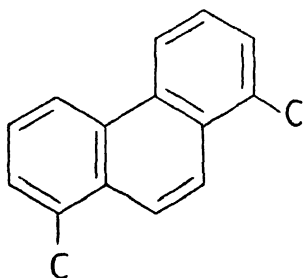
190

0.2¹¹⁸

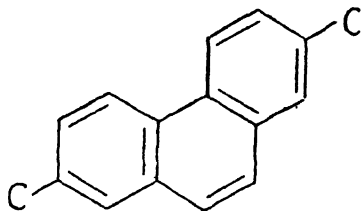
158–160

0.1⁶⁹**2,6-Dimethylphenanthrene**

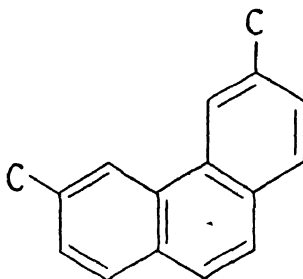
M. P., °C

33–34⁶⁴**1,8-Dimethylphenanthrene**

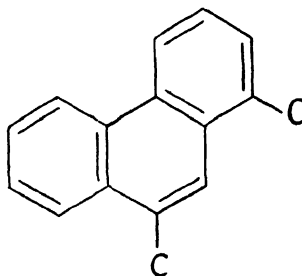
M. P., °C

191–192⁶⁴**2,7-Dimethylphenanthrene**

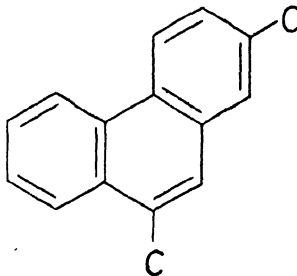
M. P., °C

101–102⁶⁴**3,6-Dimethylphenanthrene**

M. P., °C

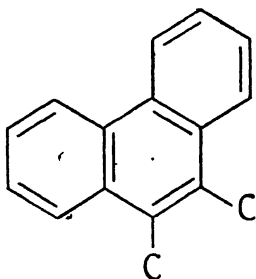
141⁶⁴**1,9-Dimethylphenanthrene**

M. P., °C

88³⁵87–88⁶²**2,9-Dimethylphenanthrene**

M. P., °C

56–57⁶⁴55–56¹²⁴

9,10-Dimethylphenanthrene

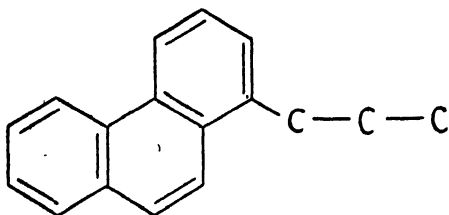
M. P., °C
 142.5–143^{25A}
 139¹⁴³

x,x-Dimethylphenanthrene (a)

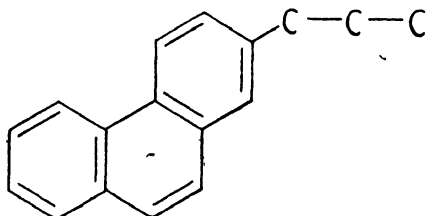
M. P., °C
 126–127⁴⁶

(a) The structure of this compound was not clearly defined in the literature.

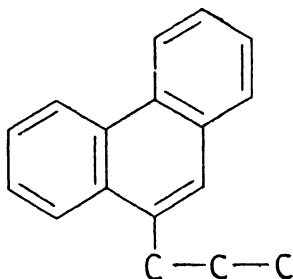
$C_{17}H_{16}$

1-n-Propylphenanthrene

M. P., °C
 34–35⁶⁴
 32–33⁹

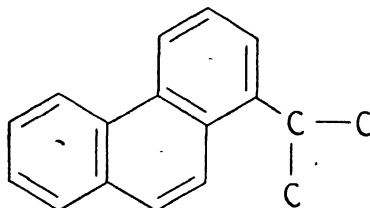
2-n-Propylphenanthrene

M. P., °C
 35–36⁷

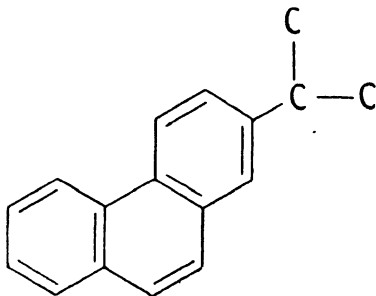
9-n-Propylphenanthrene

M. P., °C
 74⁸⁹
 58.5–59.5⁶
 59³

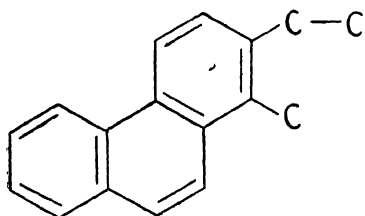
B. P., °C @ 760mm
 265–270 22⁸⁹

1-Isopropylphenanthrene

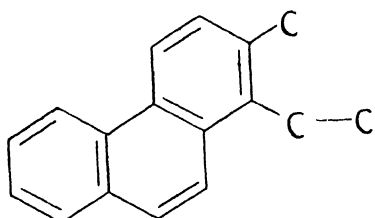
M. P., °C
 88–88.5⁹
 85–86⁶⁴

2-Isopropylphenanthrene

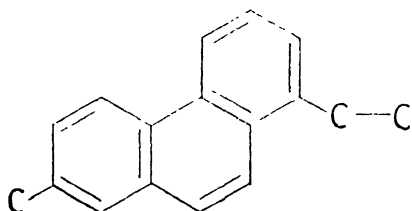
M. P., °C
 44–45⁶⁴

1-Methyl-2-ethylphenanthrene

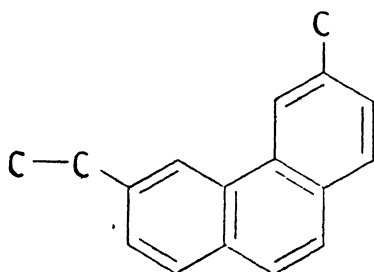
M. P., °C
100⁶⁴

1-Ethyl-2-methylphenanthrene

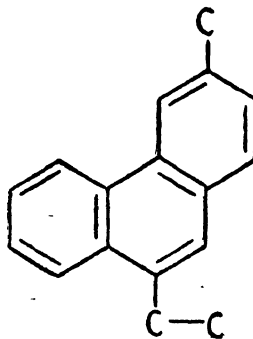
M. P., °C
80⁶⁴

1-Ethyl-7-methylphenanthrene

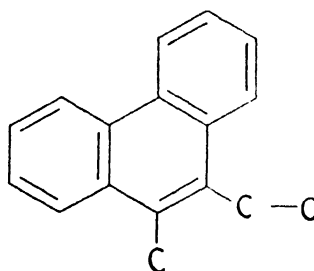
M. P., °C
81⁵⁸
80-81¹⁰⁹

3-Methyl-6-ethylphenanthrene

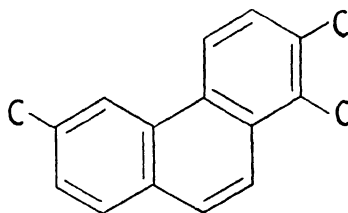
M. P., °C
47-48⁵

3-Methyl-9-ethylphenanthrene

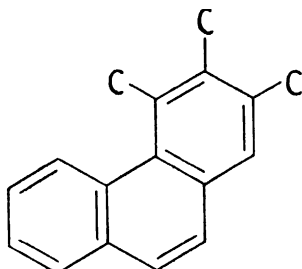
M. P., °C
47-48⁵

9-Methyl-10-ethylphenanthrene

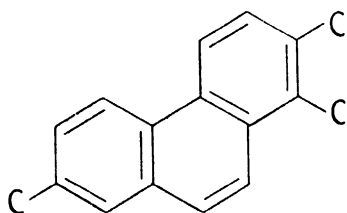
M. P., °C
85²⁵

1,2,6-Trimethylphenanthrene

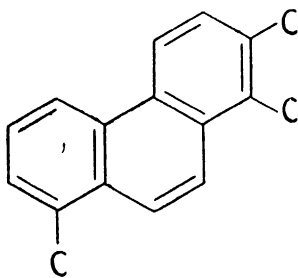
M. P., °C
128.5-129¹¹¹
128-129¹¹³

2,3,4-Trimethylphenanthrene

M. P., °C
62.8–63.8⁴⁷

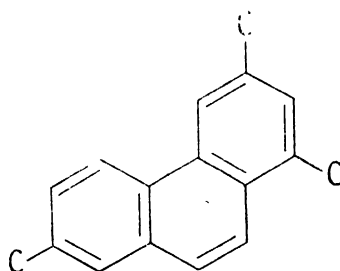
1,2,7-Trimethylphenanthrene

M. P., °C
120–121⁶⁰

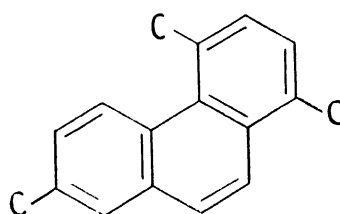
1,2,8-Trimethylphenanthrene

M. P., °C
144
212–213¹²²
146–147¹¹²
144–145^{62, 106}
144⁷¹
142–143¹⁰⁸
141–142³⁸

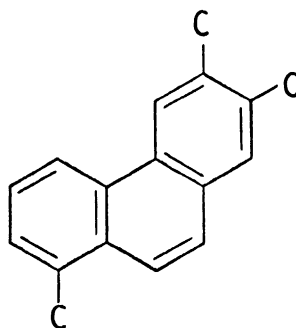
B. P., °C @ 760mm
175–180 0.5⁷¹
160–165 0.2¹⁰⁸

1,3,7-Trimethylphenanthrene

M. P., °C
68–69⁶⁰

1,4,7-Trimethylphenanthrene

M. P., °C
72–73⁶¹

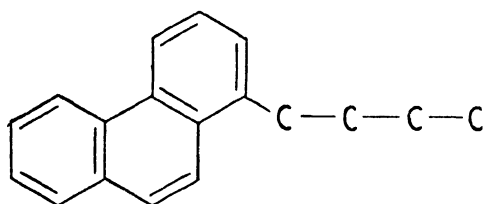
2,3,8-Trimethylphenanthrene

M. P., °C
123–124⁶⁰

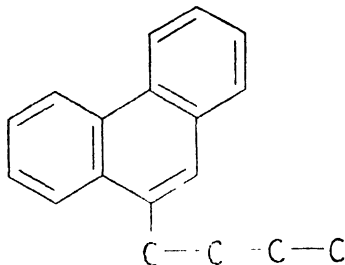
x,x,x-Trimethylphenanthrene (a)

M. P., °C
81¹⁰⁵

(a) The structure of this compound was not clearly defined in the literature.

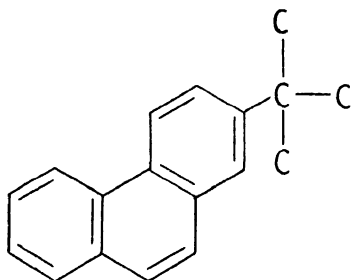
C₁₈H₁₈**1-*n*-Butylphenanthrene**

M. P., °C
42⁹

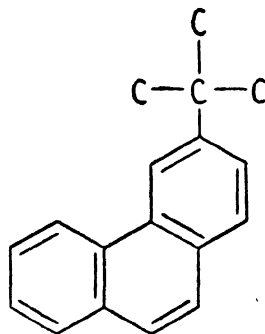
9-*n*-Butylphenanthrene

M. P., °C
78.5–79³
58⁸⁹

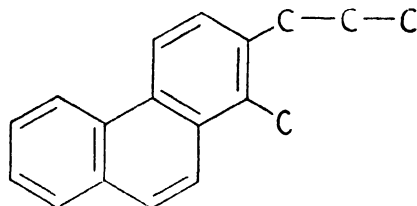
B. P., °C @ 760mm
282–284

20⁸⁹**2-*tert*-Butylphenanthrene**

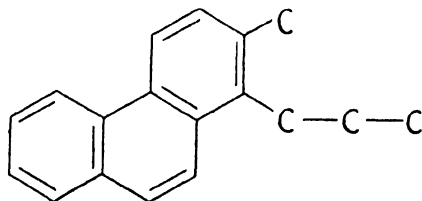
M. P., °C
99–100⁵¹

3-*tert*-Butylphenanthrene

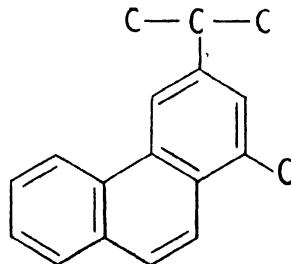
M. P., °C
54–55⁵¹

1-Methyl-2-*n*-propylphenanthrene

M. P., °C
54⁷⁸

1-*n*-Propyl-2-methylphenanthrene

M. P., °C
65³¹

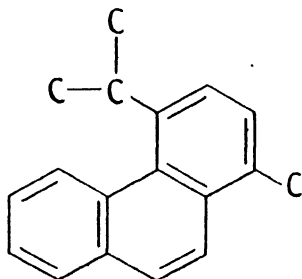
1-Methyl-3-isopropylphenanthrene

M. P., °C
79³³

B. P., °C @ 760mm
18

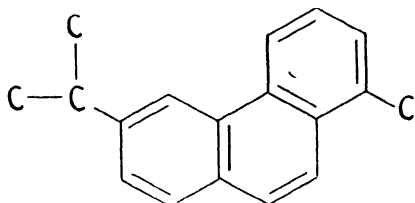
1.5³³

1-Methyl-4-isopropylphenanthrene



M. P., °C
68–68.5²⁴

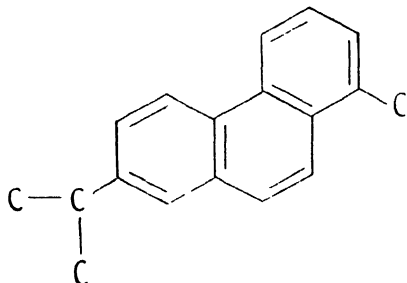
1-Methyl-6-isopropylphenanthrene (a) (Isoretene)



M. P., °C
86–87¹⁴

(a) The structure of this compound was not clearly defined in the literature.

1-Methyl-7-isopropylphenanthrene (Retene)



M. P., °C

98.5

100.5–101¹¹⁵100.5⁷³100¹²⁶99^{40, 116, 128}98.5–99^{23, 90, 121}

98–99 (a)

97–99^{39, 74}98.2–98.8⁴³

98.5 (b)

98 (c)

97–98⁷²97.5³⁷96^{27, 37, 45}95.2^{41, 42}95^{19, 20, 21, 131, 141}

B. P., °C @ 760mm

394

400¹³¹394¹²³390–393⁹³390²²

216

208–210

135

11¹³³10^{1, 134}0⁸⁰

D_4^{20}

1.063

1.077

1.067 (solid)

1.093 (solid)

1.0841

1.0908

98.2–98.8°⁴³98.2–98.8°⁴³90°⁴³90°⁴³25.6°¹³⁵17.5°¹³⁵

n_D^{20}

1.61783

1.62132

1.64921

1.65286

1.62662

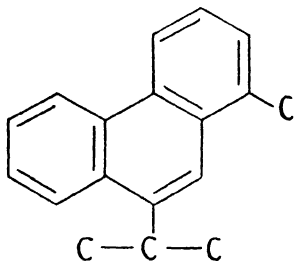
1.63009

 $n_{H\alpha}^{25.6\ 135}$ $n_{H\alpha}^{17.5\ 135}$ $n_{H\beta}^{25.6\ 135}$ $n_{H\beta}^{17.5\ 135}$ $n_{He}^{25.6\ 135}$ $n_{He}^{17.5\ 135}$

(a) The melting point 98–99 is found in references 12, 30, 61, 74, 77, 79, 85, 110, 132, 136.

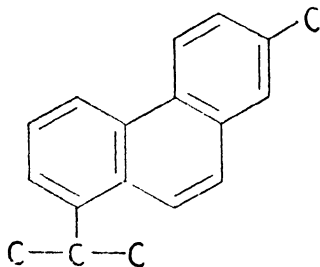
- (b) The melting point 98.5 is found in references 1, 10, 24, 44, 134, 135.
 (c) The melting point 98 is found in references 28, 92, 96, 97, 117, 120, 125, 129, 133.

1-Methyl-9-isopropylphenanthrene



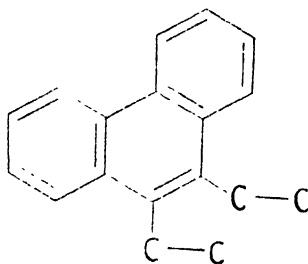
B. P., °C @ 760mm 14³⁶
 204-205

2-Methyl-8-isopropylphenanthrene (Scianthrene)



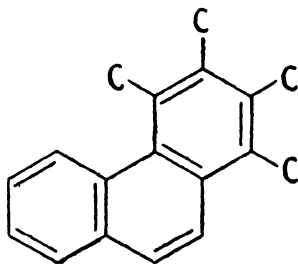
M. P., °C
 86-87¹³⁰
 82-83⁹⁴

9,10-Diethylphenanthrene



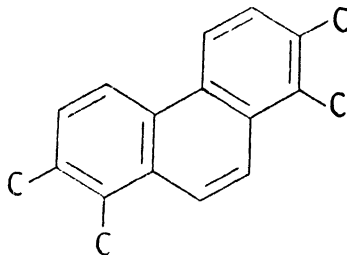
M. P., °C
 90-91¹²⁷

1,2,3,4-Tetramethylphenanthrene



M. P., °C
 92-93⁶⁶

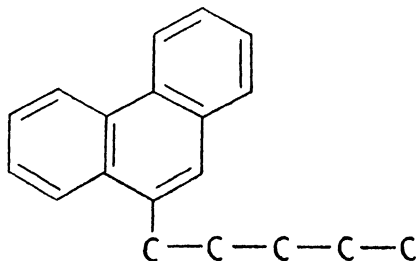
1,2,7,8-Tetramethylphenanthrene



M. P., °C
 126-127¹⁰⁷

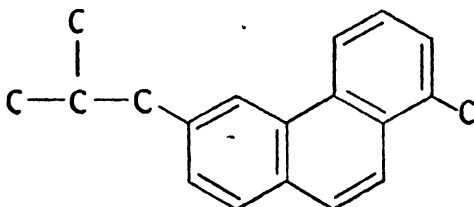
C₁₉H₂₀

9-*n*-Pentylphenanthrene



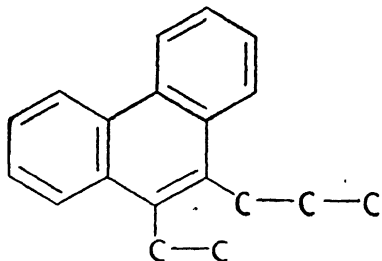
M. P., °C
 69-70^{25A}

1-Methyl-6-isobutylphenanthrene



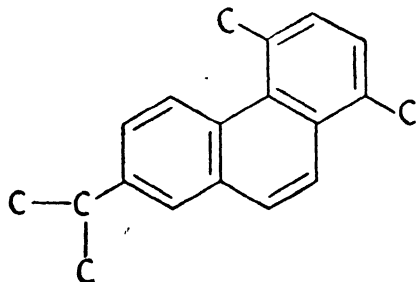
M. P., °C
49–50¹⁰⁴

9-Ethyl-10-*n*-propylphenanthrene



M. P., °C
69²⁵

1,4-Dimethyl-7-isopropylphenanthrene



M. P., °C
61–62⁶¹

1,*x*-Dimethyl-7-isopropylphenanthrene (a)
(Methylretene)

M. P., °C
81–82¹⁰⁹
79¹¹⁰
78.5¹²⁷

(a) The structure of this compound was not clearly defined in the literature.



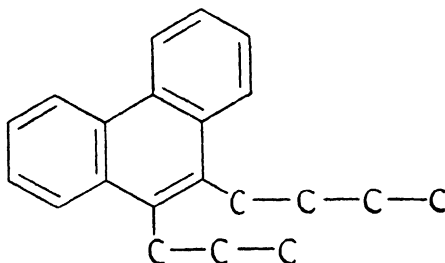
1-Methyl-*x*-ethyl-7-isopropylphenanthrene (a)

M. P., °C
54–55²³

(a) The structure of this compound was not clearly defined in the literature.



9-*n*-Propyl-10-*n*-butylphenanthrene



M. P., °C
74²⁵

1-Methyl-7,*x*-diisopropylphenanthrene (a)
(Isopropylretene)

M. P., °C
52–53⁹²

B. P., °C @ 760mm
231–233 9.5⁹²

D_4^{20}
1.0125⁹²

(a) The structure of this compound was not clearly defined in the literature.

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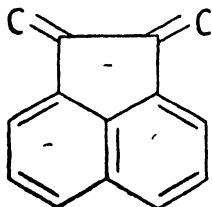
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4. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-18}



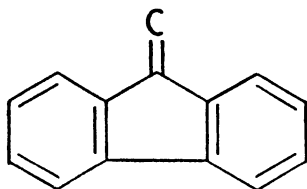
1,2-Dimethylenecacenaphthene



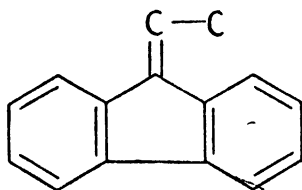
M. P., °C

184 (a)⁴¹158 (b)⁴¹

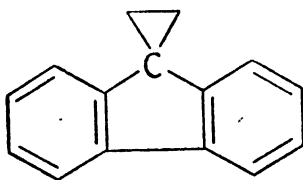
- (a) This constant was determined on the *trans* isomer of the compound.
- (b) This constant was determined on the *cis* isomer of the compound.

9-Methylenefluorene

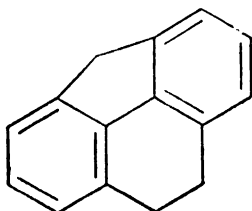
M. P., °C

104–106³⁹53²³, 7846–48⁵⁹ $C_{16}H_{12}$ **9-Ethylidenefluorene**

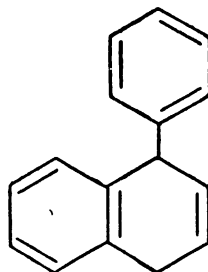
M. P., °C

104¹⁸, 20, 64, 66, 67102⁵¹100⁴²**Spiro[fluorene-9,1'-cyclopropane]**

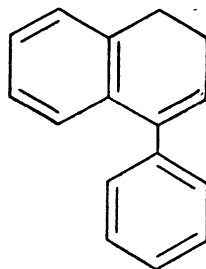
M. P., °C

73–73.5⁷⁷**Cyclopentano-[def]-9,10-dihydro-phenanthrene**

M. P., °C

140.5–141.2²⁶ $C_{16}H_{14}$ **1-Phenyl-1,4-dihydronaphthalene**

M. P., °C

50⁶³**4-Phenyl-1,2-dihydronaphthalene**

B. P., °C @ 760mm

302⁷⁵

175–177

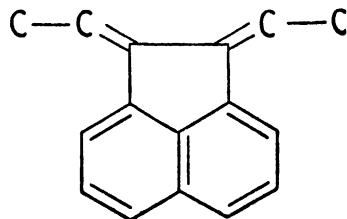
12⁷⁶

186–188

10⁶⁸ D_4^{20}

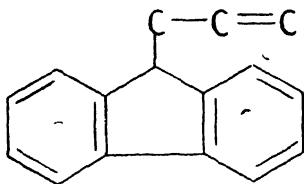
1.0784

27° 70

1,2-Diethylideneacenaphthene

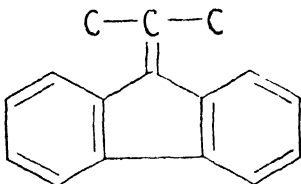
M. P., °C

140⁴⁰

9-(Propen-2'-yl)-fluorene

B. P., °C @ 760mm

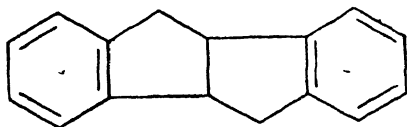
174-176

15⁷⁹**9-Isopropylidene fluorene**

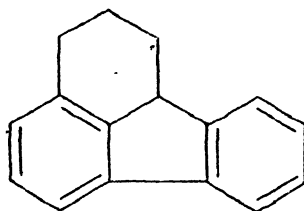
M. P., °C

113-117^{30, 33}113 (a)⁵⁵89 (a)¹⁸

(a) These constants were determined on stereoisomers.

2,3,6,7-Dibenzobicyclo-[3,3,0]-octane

M. P., °C

102⁸100⁵³**Cyclohexano-[jk]-fluorene**

M. P., °C

75

76³⁶75³⁵74-75⁷⁴73-74⁷³

B. P., °C @ 760mm

363-365

749³⁵

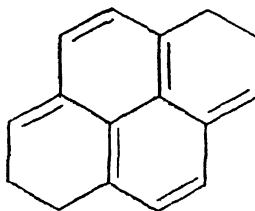
203-205

127⁴

200-205

127³

155

0.7⁶⁹**1,2,6,7-Tetrahydropyrene**

M. P., °C

138¹⁷**x₁-Tetrahydropyrene (a)**

M. P., °C

84⁴⁵

(a) The structure of this compound was not clearly defined in the literature.

**x-Phenethenylindane (a)**

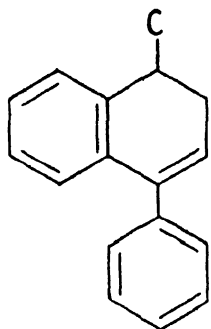
B. P., °C @ 760mm

198-201

18⁶⁰

(a) The structure of this compound was not clearly defined in the literature.

1-Methyl-4-phenyl-1,2-dihydronaphthalene

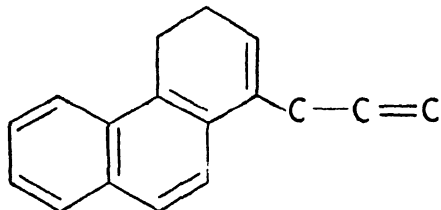


M. P., °C
48⁷⁰

B. P., °C @ 760mm
185–188 14⁷⁰

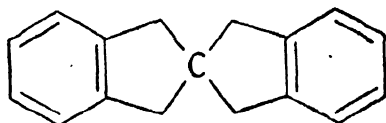
D_4^{20}
1.0513 22° 70

1-(Propen-2'-yl)-3, 4-dihydrophenanthrene



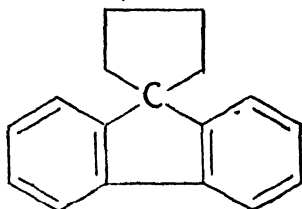
M. P., °C
129–130.5⁵⁶

Spiro[indane-2,2'-indane]



M. P., °C
66–67³⁷

Spiro[fluorene-9,1'-cyclopentane]



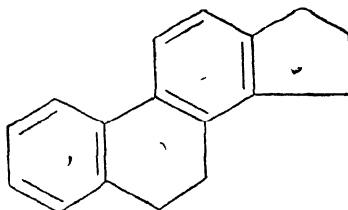
M. P., °C
91²

x₁-Tetrahydro-x, x-benzofluorene (a)

M. P., °C
129³⁴

(a) The structure of this compound was not clearly defined in the literature.

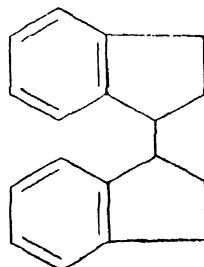
1,2-Cyclopentano-9,10-dihydro-phenanthrene



M. P., °C
65–69¹¹

C₁₈H₁₈

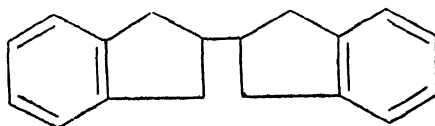
1,1'-Biindanyl



B. P., °C @ 760mm
194–195 14⁶²

D_4^{20}
1.0669 24° 62

2,2'-Biindanyl



M. P., °C

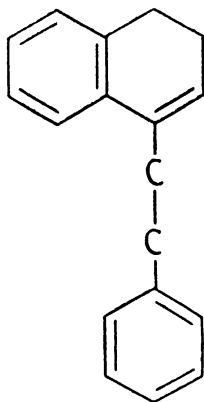
165–166^{24, 25}

B. P., °C @ 760mm

239–241

50⁶¹

225–226

20⁶¹**4-Phenethyl-1,2-dihydronaphthalene**

M. P., °C

209–212

16¹⁸

165–168

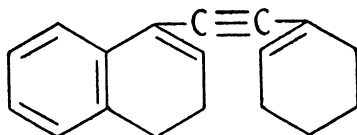
12⁵⁴**x-Phenethenyl-1,2,3,4-tetrahydronaphthalene (a)**

B. P., °C @ 760mm

216–218

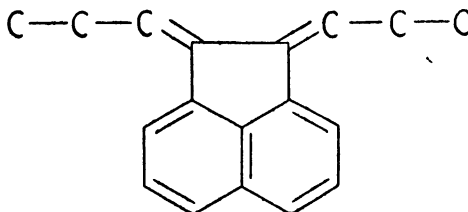
18⁶⁰

(a) The structure of this compound was not clearly defined in the literature.

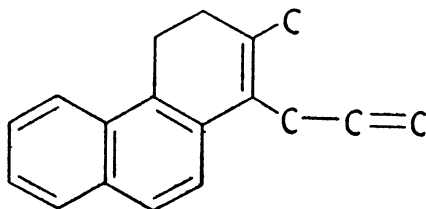
Cyclohexen-1-yl-[4'-(1',2'-dihydronaphthyl)]-ethyne

B. P., °C @ 760mm

170–172

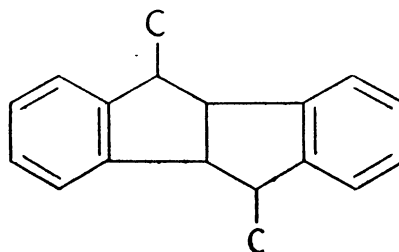
2⁴⁶D₄²⁰1.0443⁴⁶ n_D^{20} 1.6186⁴⁶**1,2-Dipropylideneacenaphthene**

M. P., °C

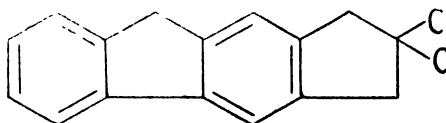
101⁴¹**1-(Propen-2'-yl)-2-methyl-3,4-dihydrophenanthrene**

B. P., °C @ 760mm

177–179

0.6¹²**2,3,6,7-Dibenzo-4,8-dimethylbicyclo-[3,3,0]-octane**

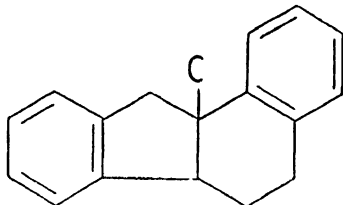
M. P., °C

94⁷**2,3-(4',4'-Dimethylcyclopentano)-fluorene**

M. P., °C

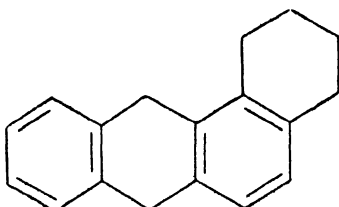
135–137 (a)³²128–129 (a)³²

(a) These constants were determined on different forms.

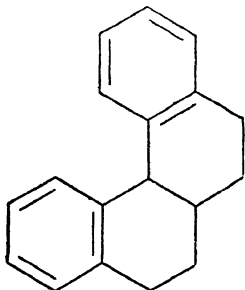
1,2-Benzo-9a-methyl-3,4,4a,9a-tetrahydrofluorene

B.P., °C @ 760mm

159

0.8¹⁶**1,2-Cyclohexano-9,10-dihydroanthracene**

M. P., °C

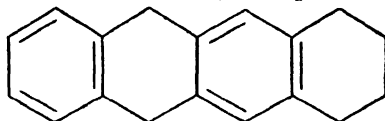
69.3–69.9²⁹**3,4-Benzo-1,2,4a,9,10,10a-hexahydraphenanthrene**

M. P., °C

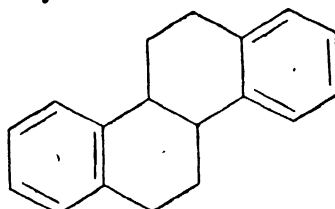
47.5–48³³

B. P., °C @ 760mm

148–153

0.2³³**1,2,3,4,6,11-Hexahydronaphthacene**

M. P., °C

128⁷¹**4b,5,6,10b,11,12-Hexahydrochrysene**

M. P., °C

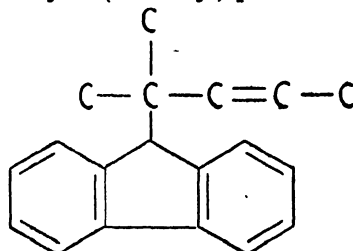
140 (a)⁴115 (a)⁵⁰112 (a)⁴⁹79 (a)⁴⁹76.8–77.8 (b)⁴⁴75 (b)^{4, 50}

B. P., °C @ 760mm

223 (a)

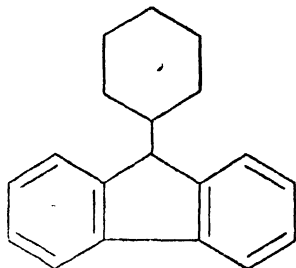
12⁵⁰

208 (b)

12⁵⁰(a) These constants were determined on the *trans* isomer of the compound.(b) These constants were determined on the *cis* isomer of the compound. $C_{19}H_{20}$ **2-Methyl-2-(9'-fluoryl)-pentene-3**

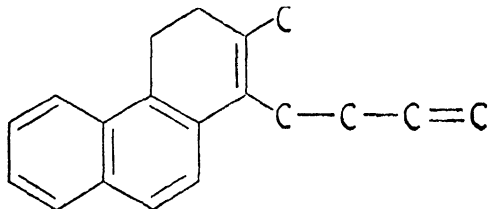
M. P., °C
92³¹

9-Cyclohexylfluorene



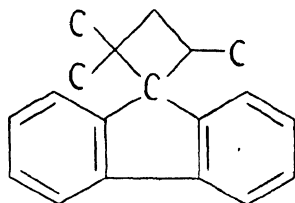
M. P., °C
115-116⁹
102-103¹³

1-(Buten-3'-yl)-2-methyl-3,4-dihydrophenanthrene



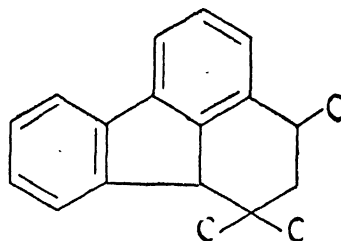
B. P., °C @ 760mm
155-160 0.3¹²

Spiro[2,2,4-trimethylcyclobutane-1,9'-fluorene]



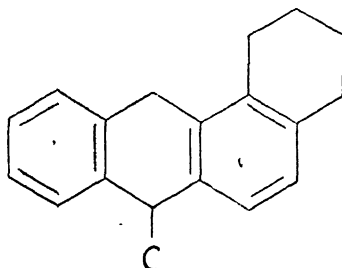
M. P., °C
92-94³¹

Benzo-[lm]-2,4,4-trimethyl-2,3,4,4a-tetrahydrofluorene



M. P., °C
103-104³¹

1,2-Cyclohexano-10-methyl-9,10-dihydroanthracene



M. P., °C
155.5-156²⁹

C₂₀H₂₂

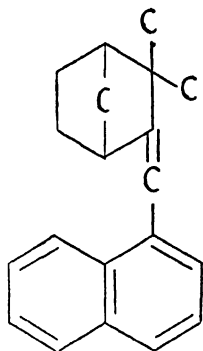
x-Naphthyl-2,2-dimethyl-3-methyl-enebicyclo-[2,2,1]-heptane (a)

M. P., °C
92-93⁸

B. P., °C @ 760mm
210 16⁸

(a) The structure of this compound was not clearly defined in the literature.

2,2-Dimethylbicyclo-[2,2,1]-heptyliden-3-yl-(1'-naphthyl)-methane



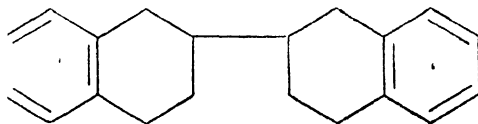
B. P., °C @ 760mm
186.5–188

1¹ D_4^{20}

1.0525

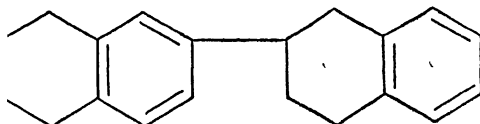
 D_0^{20}

Bi-2,2'-(1,2,3,4-tetrahydronaphthyl)



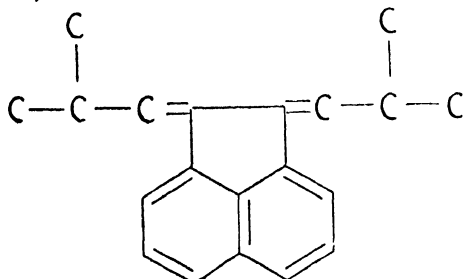
M. P., °C
113⁷²

Bi-2,6'-(1,2,3,4-tetrahydronaphthyl)



M. P., °C
53–54⁵⁷

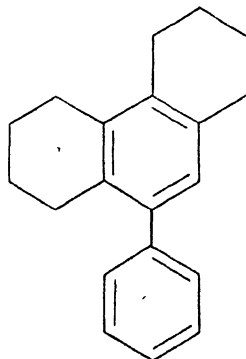
1,2-Diisobutylideneacenaphthene



B. P., °C @ 760mm
215

15⁴¹

9-Phenyl-1,2,3,4,5,6,7,8-octahydrophenanthrene

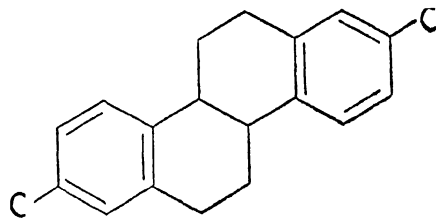


M. P., °C
94²²

B. P., °C @ 760mm
186

0.2²²

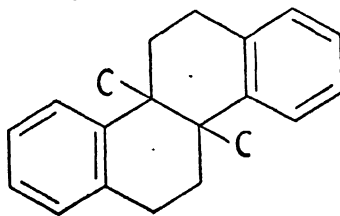
2,8-Dimethyl-4b,5,6,10b,11,12-hexahydrochrysene



M. P., °C
140 (a)⁴⁹
108 (a)⁴⁹

(a) These constants were determined on different forms.

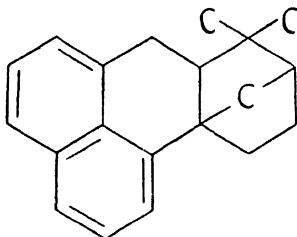
4b,10b-Dimethyl-4b,5,6,10b,11,12-hexahydrochrysene



M. P., °C

144 (a)⁴⁹105 (a)⁴⁹

(a) These constants were determined on different forms.

Benzo-[fg]-1,1-dimethyl-2,4a-methylene-1,2,3,4,4a,9,9a-heptahydroanthracene (a)

B. P., °C @ 760mm

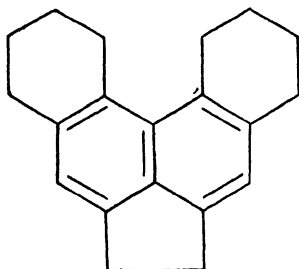
185–186

1¹ D_4^{20}

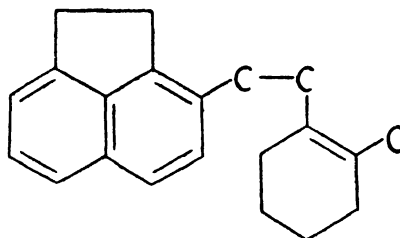
1.0991

 D_0^{20} 1 n_D^{20} 1.6205¹

(a) The structure of this compound was not clearly defined in the literature.

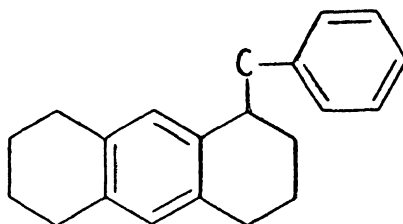
Cyclohexano-[g]-cyclopentano-[jk]-1,2,3,4-tetrahydrophenanthrene

M. P., °C

148.6–149.0⁵³C₂₁H₂₄**1-(3'-Acenaphthyl)-2-(2''-methylcyclohexen-1''-yl)-ethane**

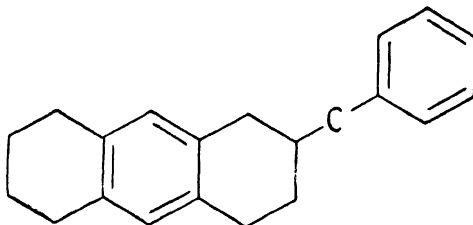
B. P., °C @ 760mm

182–185

0.2–0.3¹⁴**1-Benzyl-1,2,3,4,5,6,7,8-octahydroanthracene**

B. P., °C @ 760mm

244–246

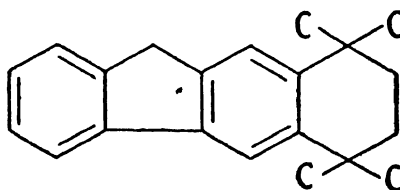
14⁵⁸**2-Benzyl-1,2,3,4,5,6,7,8-octahydroanthracene**

M. P., °C

65–66⁵³

B. P., °C @ 760mm

248–251

12⁵⁸**2,3-(3',3',6',6'-Tetramethylcyclohexano)-fluorene**

M. P., °C
93-94¹⁰

C₂₂H₂₆

1,1-Di-[x'-(x'-tetrahydronaphthyl)]-ethane (a)

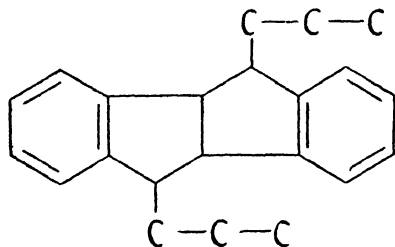
B. P., °C @ 760mm
384⁵²

261-263

16⁵²

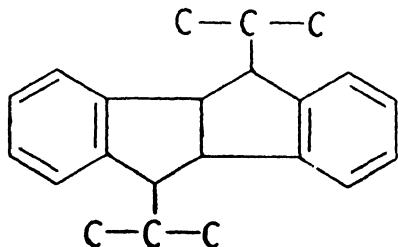
(a) The structure of this compound was not clearly defined in the literature.

3,4,7,8-Dibenzo-2,6-di-*n*-propylbicyclo-[3,3,0]-octane
(9,12-Di-*n*-propyldiphenysuccindane)



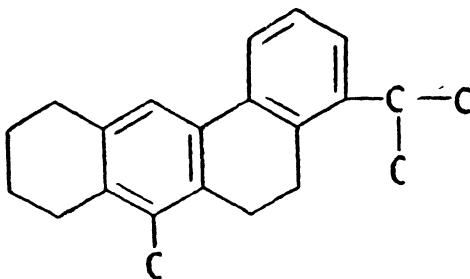
M. P., °C
98-99⁶

3,4,7,8-Dibenzo-2,6-diisopropylbicyclo-[3,3,0]-octane
(9,12-Diisopropyldiphenysuccindane)



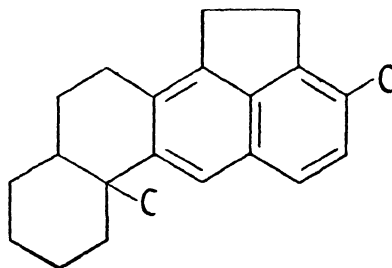
M. P., °C
80-81⁶

1-Isopropyl-6,7-cyclohexano-8-methyl-9,10-dihydrophenanthrene



M. P., °C
44.8-46²⁷

3,6b-Dimethyl-6b,7,8,9,10,10a,11,12-octahydrocholanthrene



M. P., °C
132-134¹³

C₂₈H₃₈

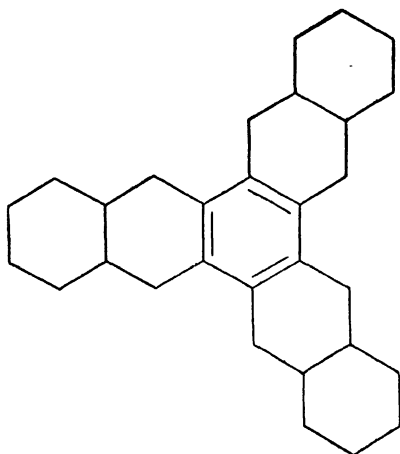
x,x,x-Tricyclohexylnaphthalene (a)

M. P., °C
121-122⁴⁷

(a) The structure of this compound was not clearly defined in the literature.

C₃₀H₄₂

1,2,3,4,5,6-Tri-(3',2'-octahydronaphtho)-benzene



M. P., °C
360–362⁴⁸

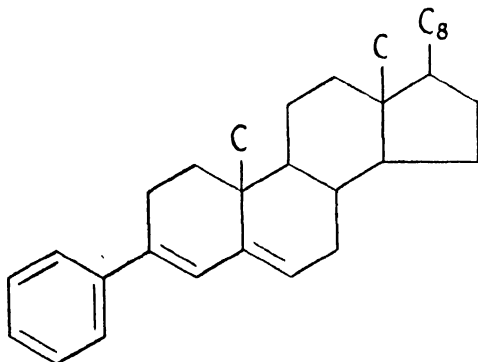
C₃₃H₄₈**3-Phenylcholestadiene-2,4 (a)**

M. P., °C
174–175⁶⁵

Additional Data

$$[\alpha]_D^{20} = -133^{\circ} 65$$

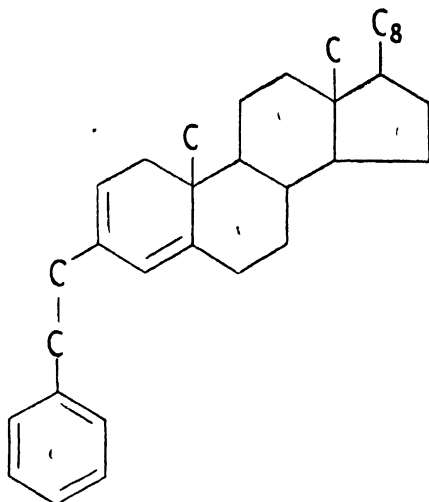
(a) The structure of this compound was not clearly defined in the literature.

3-Phenylcholestadiene-3,5

M. P., °C
158–159³

Additional Data

$$[\alpha]_D^{25} = -132^{\circ} 3$$

C₃₆H₅₂**3-Phenethylcholestadiene-2,4**

M. P., °C
94–95¹⁹

C₃₆H₅₄**Phenylfriedelene (a)**

M. P., °C
269–271²¹

(a) The structure of this compound was not clearly defined in the literature.

References on Miscellaneous Polynuclear Aromatics of Empirical Formula

C_nH_{2n-18}

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VII. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA



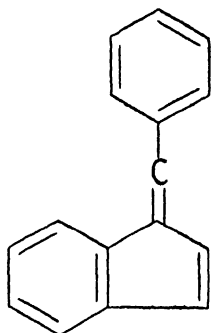
1. Indene Derivatives of Empirical Formula $\text{C}_n\text{H}_{2n-10}$
2. Naphthalene Derivatives of Empirical Formula $\text{C}_n\text{H}_{2n-10}$
3. Cyclanoanthracenes and Their Alkyl Derivatives
4. Cyclanophenanthrenes and Their Alkyl Derivatives
5. Miscellaneous Polynuclear Aromatics of Empirical Formula $\text{C}_n\text{H}_{2n-10}$

1. INDENE DERIVATIVES OF EMPIRICAL FORMULA C_nH_{2n-20}

$C_{16}H_{12}$

1-Benzylideneindene

(Phenylbenzofulvene)



M. P., °C

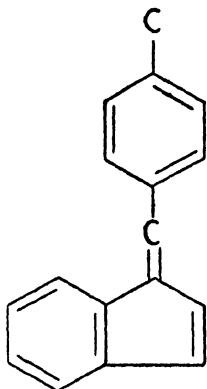
88-89⁷

88^{2, 4}

87³

$C_{17}H_{14}$

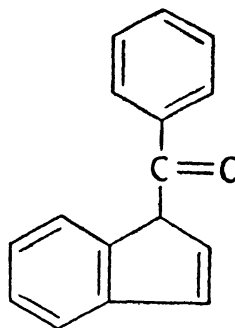
1-(4'-Methylbenzylidene)-indene



M. P., °C

91-92¹

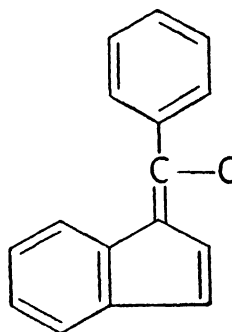
1-Phenyl-1-indenylethene



M. P., °C

80²

1-Phenyl-1-indenylidene-ethane



M. P., °C

70²

68-69⁶

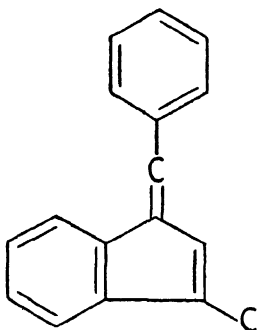
B. P., °C @ 760mm

204-205

178-179

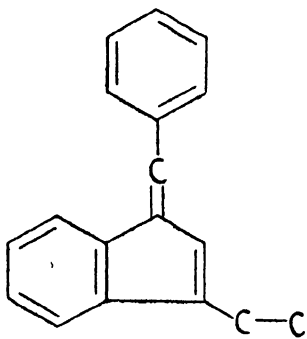
16⁶

5⁶

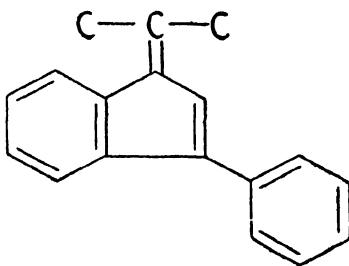
1-Benzylidene-3-methylindene

M. P., °C
43–44^{5, 9}

C₁₈H₁₆

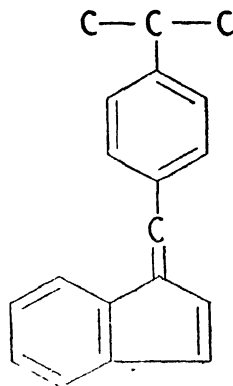
1-Benzylidene-3-ethylindene

M. P., °C
58⁸

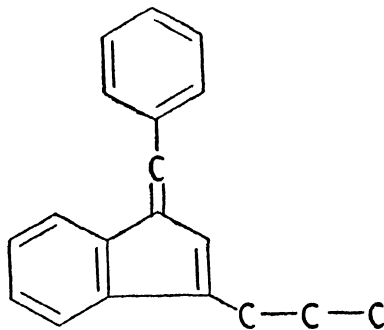
1-Isopropylidene-3-phenylindene

M. P., °C
99.5–100¹⁰

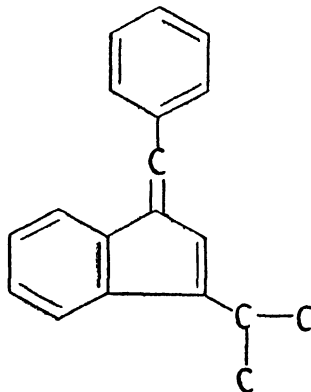
C₁₉H₁₈

1-(4'-Isopropylbenzylidene)-indene

M. P., °C
60–61¹

1-Benzylidene-3-n-propylindene

M. P., °C
132⁸

1-Benzylidene-3-isopropylindene

M. P., °C
101⁶

*References on Indene Derivatives of
Empirical Formula C_nH_{2n-20}*

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2. NAPHTHALENE DERIVATIVES OF EMPIRICAL
FORMULA C_nH_{2n-20}



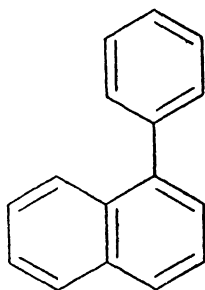
Cyclopentadien-2,4-ylidene-(x'-
naphthyl)-methane (a)

M. P., °C

87-88¹⁶

(a) The structure of this compound was not clearly defined in the literature.

1-Phenylnaphthalene



M. P., °C

84-86⁶

B. P., °C @ 750mm

336-337²⁹

324-326⁵⁹

324-325⁵¹

334

770⁶¹

194

18²⁹

192-195

16-17⁵¹

190

12⁴²

189-190

12⁵⁰

187-189

12⁵⁶

186-188

10⁵²

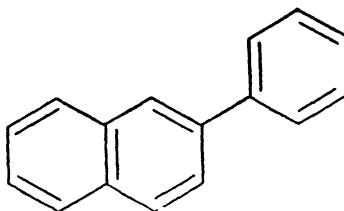
134-135

2⁶⁰

D₄²⁰

1.103⁵⁶

2-Phenylnaphthalene



M. P., °C

102

104-105¹

104²⁷

103-104¹⁰

103²³

102.2-102.7¹⁸

102-102.5²

101.5-102⁴

101-102 (a)

101.5^{11, 32}

101-101.5⁹

101⁴⁹

98.5-100¹³

98-99¹⁹

97-98⁵⁵

B. P., °C @ 760mm

357-358²³

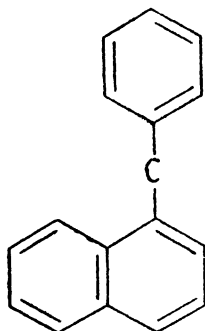
346-347⁵⁴

345-346^{9, 11}

(a) The melting point 101–102 is found in references 7, 22, 31, 45, 46, 47, 50, 54, 55, 57.



1-Benzyl-naphthalene



M. P., °C

58.6

59 (a)

59 (b)⁵⁸

58–59⁴³

58.5¹⁷

58³³

57.5–58⁸

57–58⁴¹

B. P., °C @ 760mm

350⁵³

200–205

9³⁷

D_4^{20}

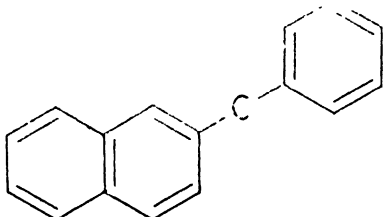
1.165

0° 33, 53

(a) The melting point 59 is found in references 3, 14, 21, 25, 38, 44, 53.

(b) This constant was given as a freezing point in the literature.

2-Benzyl-naphthalene



M. P., °C

58⁸

57³

55.5¹⁶

55–55.5⁵³

39–40⁴¹

35.5³⁸

D_4^{20}

1.176

0° 33, 53

α -Benzyl-naphthalene (a)

M. P., °C

64²⁰

58.6²⁰

58²⁸

B. P., °C @ 760mm

168.5–169

1.5²⁴

D_4^{20}

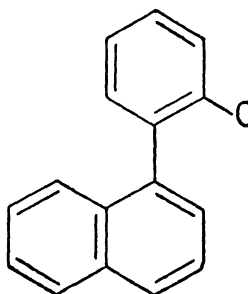
1.0777²⁴

1.166

17° 30

(a) The structure of this compound was not clearly defined in the literature.

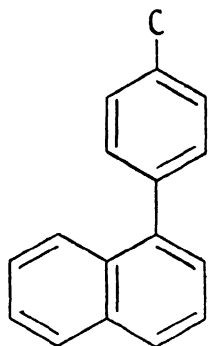
1-o-Tolyl-naphthalene



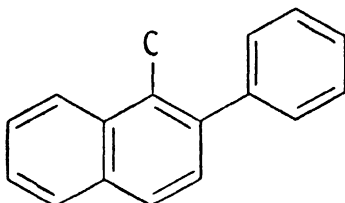
M. P., °C

67.5–68.5¹³

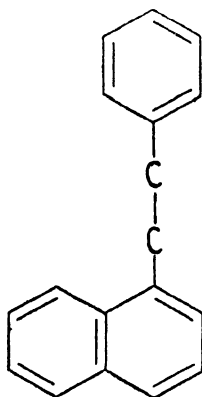
63²⁶

1-*p*-Tolynaphthalene

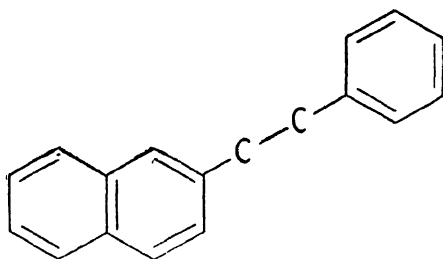
B. P., °C @ 760mm
148-150

0.15⁵**1-Methyl-2-phenylnaphthalene**

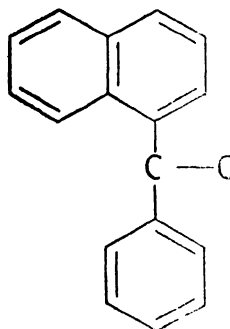
M. P., °C
84⁴⁹

C₁₈H₁₆**1-Phenethylnaphthalene**

B. P., °C @ 760mm
175

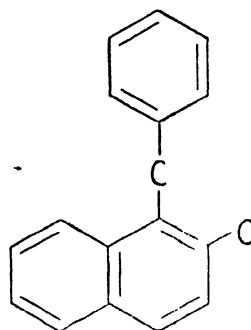
5¹²**2-Phenethylnaphthalene**

M. P., °C
99-100¹²

1-Phenyl-1-(1'-naphthyl)-ethane

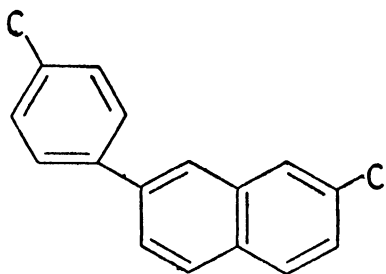
M. P., °C
69⁴⁸

B. P., °C @ 760mm
220-222

15⁴⁸**1-Benzyl-2-methylnaphthalene**

B. P., °C @ 760mm
221-222

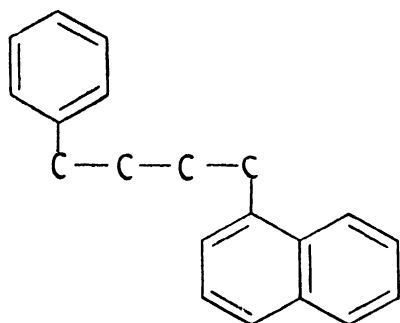
17¹⁸**2-Methyl-7-*p*-tolynaphthalene**



M. P., °C
140–141⁵⁵

C₂₀H₂₀

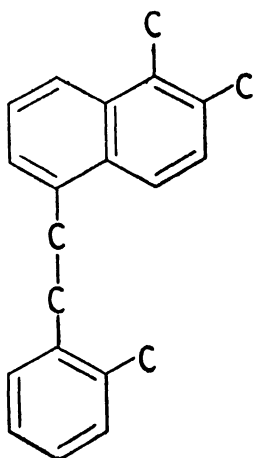
1-Phenyl-4-(1'-naphthyl)-butane



M. P., °C
80.5–82⁴⁰

C₂₁H₂₂

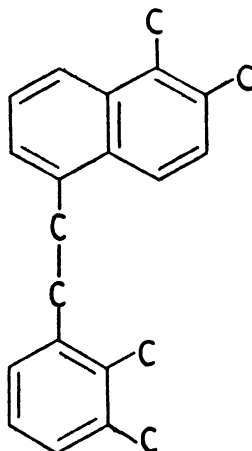
1,2-Dimethyl-5-(2'-methylphenethyl)-naphthalene



M. P., °C
60³⁹

C₂₂H₂₄

1,2-Dimethyl-5-(2',3'-dimethylphenethyl)-naphthalene



M. P., °C
90.5–91.5³⁹

C₃₁H₄₂

1-Methyl-x₄-tetracyclohexylnaphthalene (a)

M. P., °C
97³⁴

(a) The structure of this compound was not clearly defined in the literature.

C₃₄H₄₈

x₄-Tetracyclohexylnaphthalene (a)

M. P., °C
269³⁵

(a) The structure of this compound was not clearly defined in the literature.

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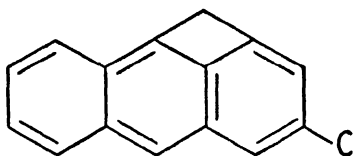
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3. CYCLANOANTHRACENES AND THEIR ALKYL DERIVATIVES, C_nH_{2n-20}

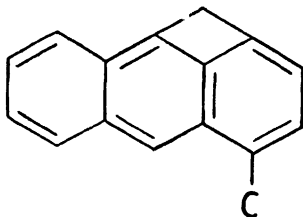


Cyclobutano-[mn]-3-methylantracene



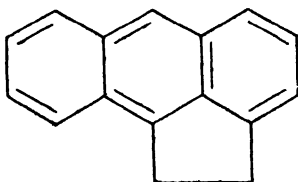
M. P., °C
85^{2, 4}

Cyclobutano-[mn]-4-methylantracene



M. P., °C
63²

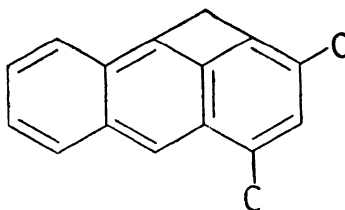
Cyclopentano-[de]-anthracene (Aceanthrene)



M. P., °C
113⁹

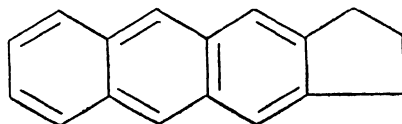


Cyclobutano-[mn]-2,4-dimethylantracene



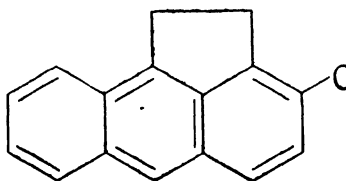
M. P., °C
64³

2,3-Cyclopentanoanthracene



M. P., °C
242-243¹⁰

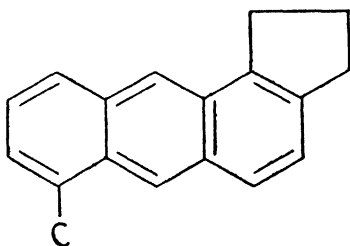
Cyclopentano-[mn]-2-methylantracene



M. P., °C
122¹

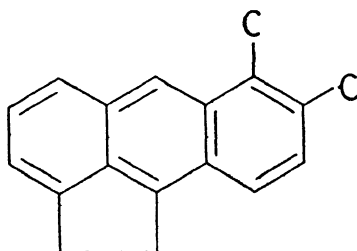


1,2-Cyclopentano-5-methylantracene



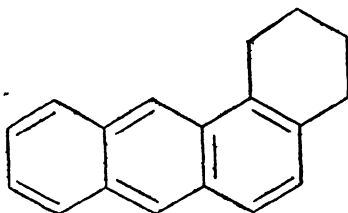
M. P., °C
131–132^s

Cyclopentano-[fg]-1,2-dimethylantracene



M. P., °C
206–207^s

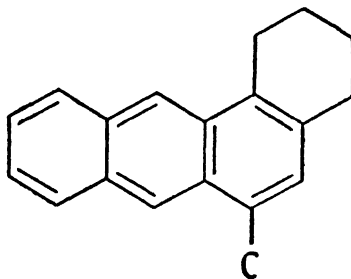
1,2-Cyclohexanoanthracene



M. P., °C
104.5–105⁷

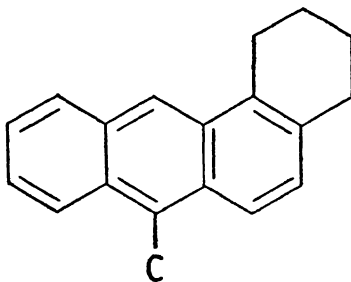


1,2-Cyclohexano-4-methylantracene



M. P., °C
82.3–82.9^s

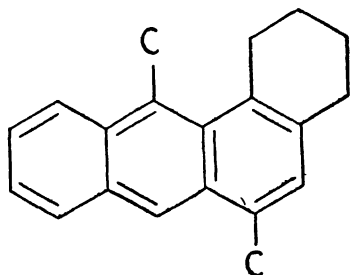
1,2-Cyclohexano-10-methylantracene



M. P., °C
117.3–117.8⁷

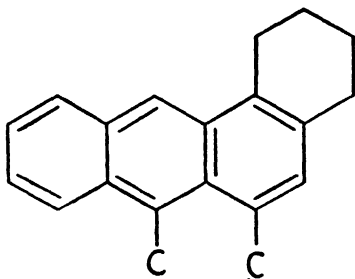


1,2-Cyclohexano-4,9-dimethylantracene



M. P., °C
62.4–62.8^s

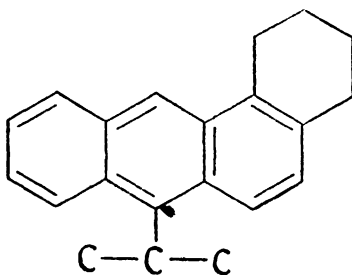
1,2-Cyclohexano-4,10-dimethylantracene



M. P., °C
105–105.5⁸

$C_{21}H_{22}$

1,2-Cyclohexano-10-isopropylanthracene



M. P., °C
81.9–82.5⁶

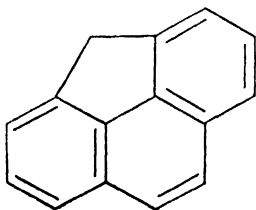
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4. CYCLANOPHENANTHRENES AND THEIR ALKYL DERIVATIVES, C_nH_{2n-20}

$C_{15}H_{10}$

Cyclopentano-[def]-phenanthrene

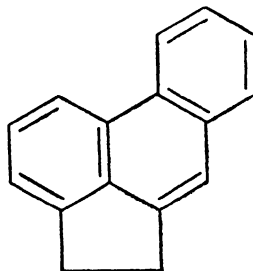


M. P., °C
116³⁵
114.6–115.3¹⁸
114.0–115.0⁷

B. P., °C @ 760mm
353³⁵

$C_{16}H_{12}$

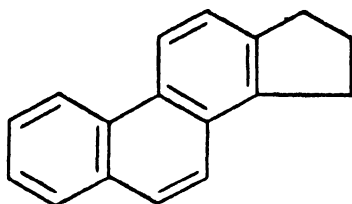
Cyclopentano-[jk]-phenanthrene



M. P., °C
106²⁵

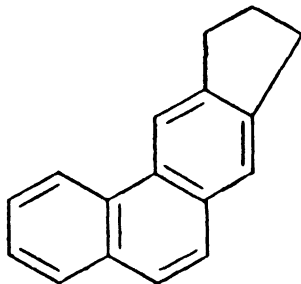
$C_{17}H_{14}$

1,2-Cyclopentanophenanthrene



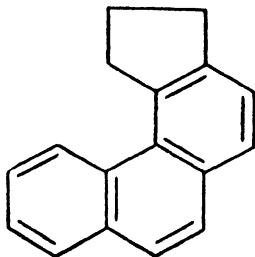
M. P., °C

135

137–138²¹135–136^{6, 33}134.4–135.8²⁸135^{8, 28, 32}134.5–135¹⁷134–135⁴⁰133–134^{15, 40}132–133⁵130–131⁵**2,3-Cyclopentanophenanthrene**

M. P., °C

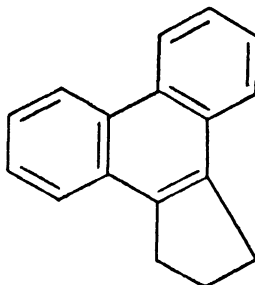
85

85–85.5^{11, 36}84–84.5¹⁵83.5–84.5⁵84⁴¹**3,4-Cyclopentanophenanthrene**

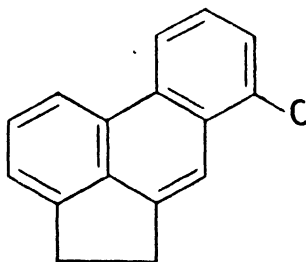
M. P., °C

73.5–75 (a)⁸71.5–72⁸

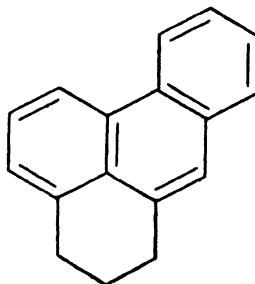
(a) This compound remelts at 60.

9,10-Cyclopentanophenanthrene

M. P., °C

154^{44, 45}150–151¹⁴149–150⁵**Cyclopentano-[jk]-1-methylphenanthrene**

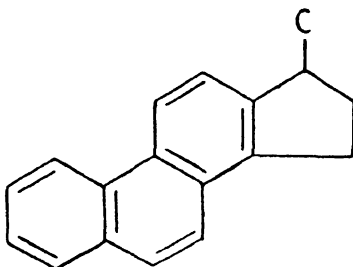
M. P., °C

159²⁵**Cyclohexano-[jk]-phenanthrene**

M. P., °C
81–82¹⁶
76–77⁵

C₁₈H₁₆

1,2-(3'-Methylcyclopentano)-phenanthrene
(Diels' Hydrocarbon)

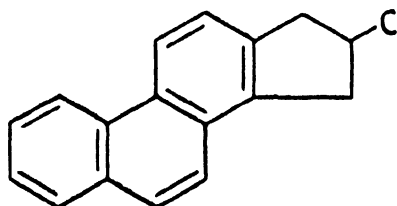


M. P., °C
126
128–129 (a)¹⁹
126.5–127³¹
126–127^{12, 30, 38}
126³⁷
125–126^{22, 27, 29, 43}
125 (a)²⁰
124–125^{10, 42}
123–124³⁹

B. P., °C @ 760mm
162–165 0.1²⁹

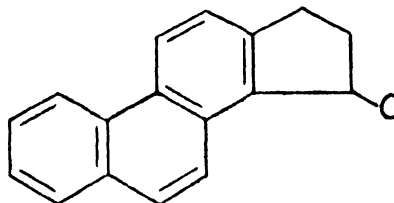
(a) Diels assigned the structure of 1,2- (cyclopenten-3'-o) -7,8- (3''-ethylcyclopenten-3''-o) - naphthalene to this compound, but it was later proved to be the above compound.

1,2-(4'-Methylcyclopentano)-phenanthrene



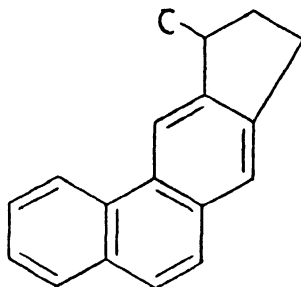
M. P., °C
106.5–107⁴⁰

1,2-(5'-Methylcyclopentano)-phenanthrene



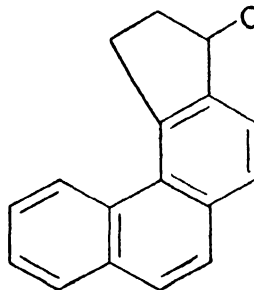
M. P., °C
76–77⁴⁰

2,3-(3'-Methylcyclopentano)-phenanthrene



M. P., °C
75–76³⁰

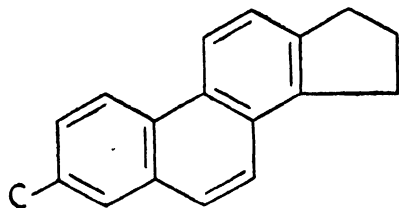
3,4-(5'-Methylcyclopentano)-phenanthrene



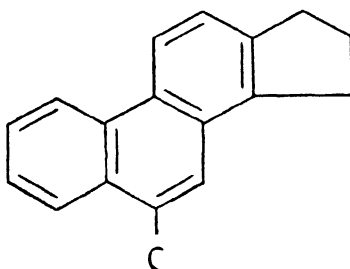
M. P., °C
28–29³⁰

B. P., °C @ 760mm
172–173

0.05³⁰

1,2-Cyclopentano-7-methylphenanthrene

M. P., °C
132³⁴

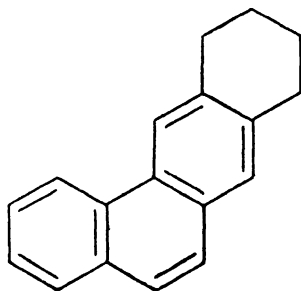
1,2-Cyclopentano-9-methylphenanthrene

M. P., °C
109–110²⁶

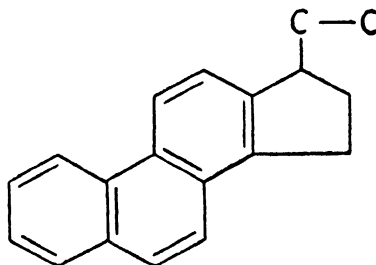
x,x-Cyclopentano-x-methylphenanthrene (a)

M. P., °C
147⁹

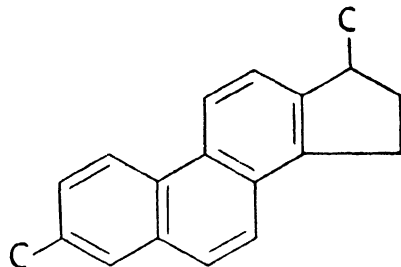
(a) The structure of this compound was not clearly defined in the literature.

2,3-Cyclohexanophenanthrene

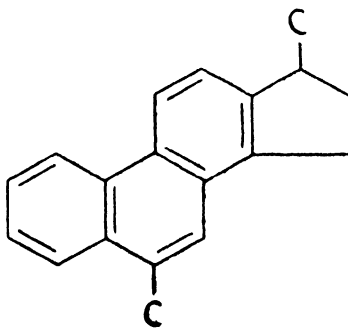
M. P., °C
88.5–89.5²⁴

C₁₉H₁₈**1,2-(3'-Ethylcyclopentano)-phenanthrene**

M. P., °C
85–86³⁸

1,2-(3'-Methylcyclopentano)-7-methylphenanthrene

M. P., °C
139–140³⁴

1,2-(3'-Methylcyclopentano)-9-methylphenanthrene

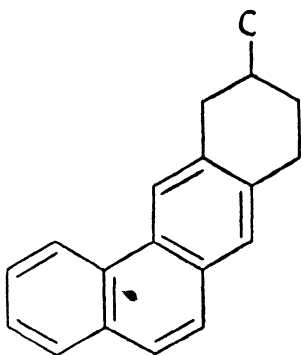
M. P., °C
80²⁶

x,x-Dimethyl-x,x-cyclopentanophenanthrene (a)

M. P., °C
165²³

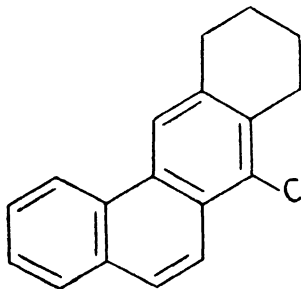
(a) The structure of this compound was not clearly defined in the literature.

2,3-(4'-Methylcyclohexano)-phenanthrene



M. P., °C
114-115.5⁴

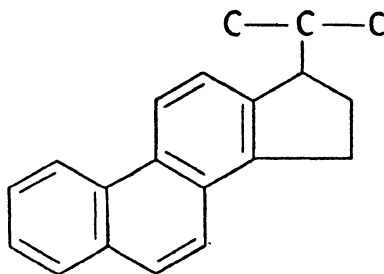
2,3-Cyclohexano-1-methylphenanthrene



M. P., °C
73.7-74.5¹⁸
73.9-74.4²⁴

C₂₀H₂₀

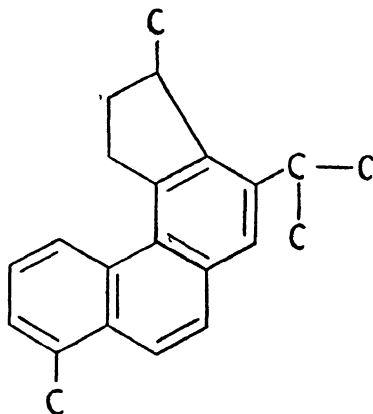
1,2-(3'-Isopropylcyclopentano)-phenanthrene



M. P., °C
97.6-98.4⁸⁸
96¹³

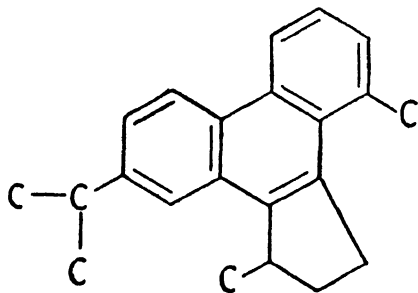
C₂₂H₂₄

3,4-(5'-Methylcyclopentano)-2-isopropyl-8-methylphenanthrene



M. P., °C
74.5-75.5³

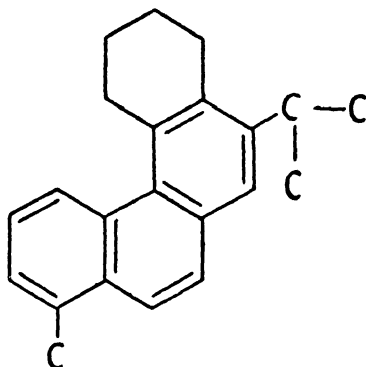
9,10-(5'-Methylcyclopentano)-1-methyl-7-isopropylphenanthrene



M. P., °C

74.5–75.5¹

3,4-Cyclohexano-2-isopropyl-8-methylphenanthrene



M. P., °C

88–89²*References on Cyclanophenanthrenes and Their Alkyl Derivatives*

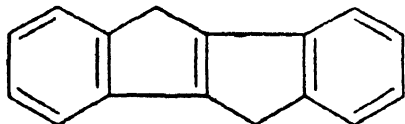
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5. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-20}



2,3,6,7-Dibenzobicyclo-[3,3,0]-
octene-1,5
(Diphenysuccindene-10)



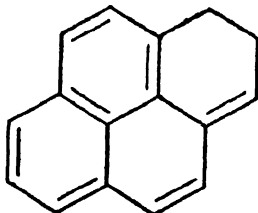
M. P., °C
210^{10, 11}

α, α -Dihydrobenzo-[jk]-fluorene (a)

M. P., °C
76²⁵

(a) The structure of this compound was not clearly defined in the literature.

1,2-Dihydropyrene



M. P., °C
132¹⁴

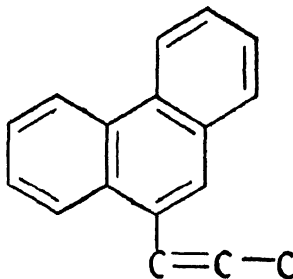
α, α -Dihydropyrene (a)

M. P., °C
106²⁹

(a) The structure of this compound was not clearly defined in the literature.



9-(Propen-1'-yl)-phenanthrene



B. P., °C @ 760mm

179

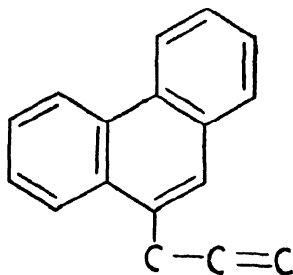
2.5⁶

n_D^{20}

1.6928

27.5°⁶

9-(Propen-2'-yl)-phenanthrene

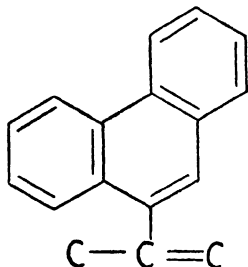


M. P., °C

51⁶

B. P., °C @ 760mm

161–163

1.25⁸ n_D^{20} 1.6280⁸**9-Isopropenylphenanthrene**

M. P., °C

38⁸

B. P., °C @ 760mm

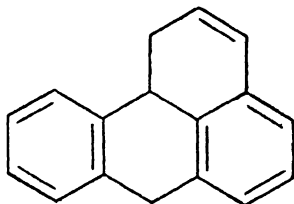
163

20⁸ n_D^{20} 1.6765⁸**x,x-Dihydrobenzo-[lm]-2-methylfluorene (a)**

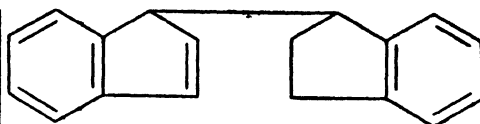
M. P., °C

127–128³⁹

(a) The structure of this compound was not clearly defined in the literature.

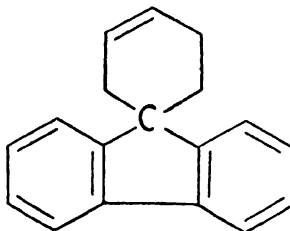
8,9-Benzo-7,9a-dihydrophenalene

M. P., °C

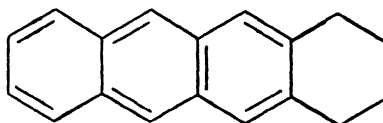
81⁵79–80³⁴C₁₈H₁₆**1-(1'-Indanyl)-indene**

B. P., °C @ 760mm

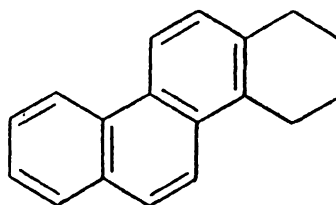
190–192

12⁸**Spiro[fluorene-9,1'-cyclohexene-3']**

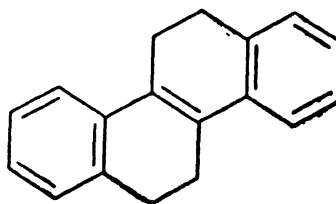
M. P., °C

145.5⁴¹**1,2,3,4-Tetrahydronaphthacene**

M. P., °C

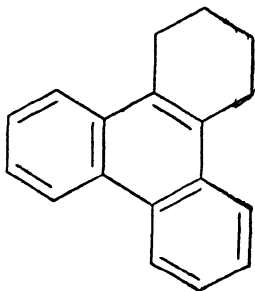
233³⁸**1,2,3,4-Tetrahydrochrysene**

M. P., °C

180.5–181.5²**5,6,11,12-Tetrahydrochrysene**

M. P., °C
105³³

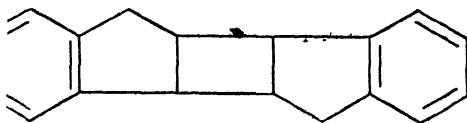
1,2,3,4-Tetrahydrotriphenylene



M. P., °C
122-123⁹
120-121⁷

1,2,3,4-Di-(3',2'-indano)-cyclobutane

(Truxane)

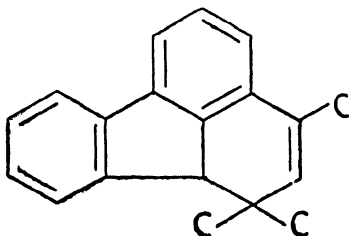


M. P., °C
116^{30, 37}

B. P., °C @ 760mm
205 20³⁷
206-207 13³⁰

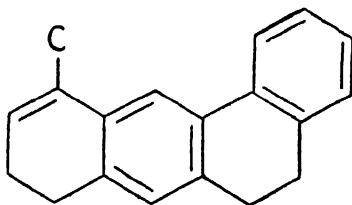
$C_{19}H_{18}$

Benzo-[lm]-2,4,4-trimethyl-4a-dihydrofluorene



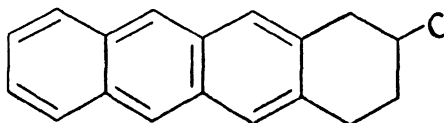
M. P., °C
77-79²²

1,2-Benzo-8-methyl-3,4,5,6-tetrahydroanthracene



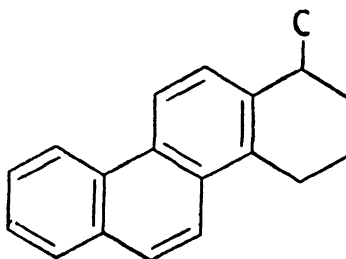
M. P., °C
70-70.5¹⁹

2-Methyl-1,2,3,4-tetrahydronaphthacene



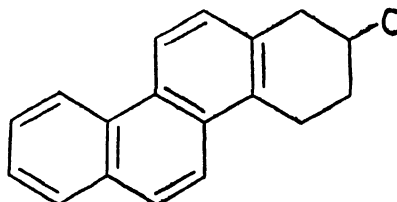
M. P., °C
203¹³

1-Methyl-1,2,3,4-tetrahydrochrysene

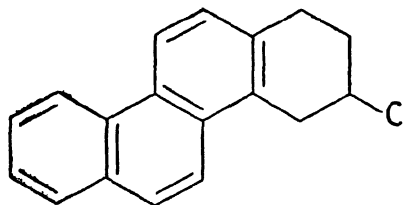


M. P., °C
120.5-121³

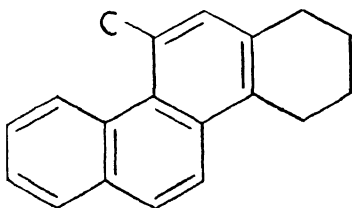
2-Methyl-1,2,3,4-tetrahydrochrysene



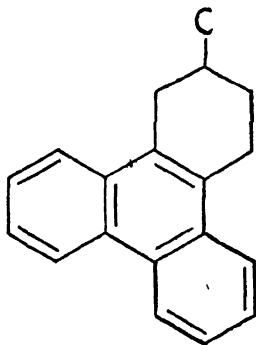
M. P., °C
141.5-142³

3-Methyl-1,2,3,4-tetrahydrochrysene

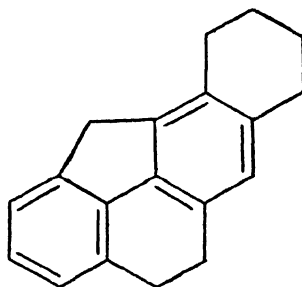
M. P., °C
130-131³

11-Methyl-1,2,3,4-tetrahydrochrysene

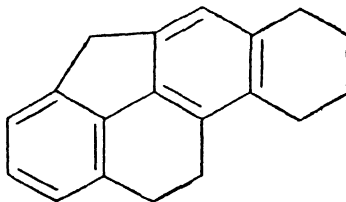
M. P., °C
71-72¹

2-Methyl-1,2,3,4-tetrahydrotriphenylene

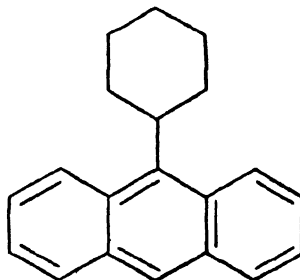
M. P., °C
116.2-116.8²¹

Cyclohexano-[b]-cyclopentano-[def]-9,10-dihydrophenanthrene

M. P., °C
83-83.5¹⁵

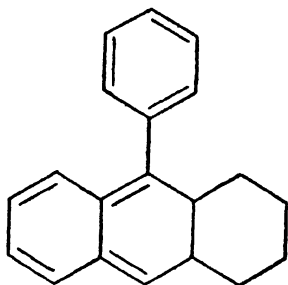
Cyclopentano-[mno]-1,2,3,4,5,6-hexahydrochrysene

M. P., °C
116.6-117.2¹⁵

C₂₀H₂₀**9-Cyclohexylanthracene**

M. P., °C
135-136^{42, 43}

9-Phenyl-1,2,3,4,4a,9a-hexahydroanthracene

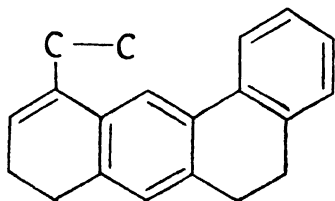


B. P., °C @ 760mm

235

1.5²³

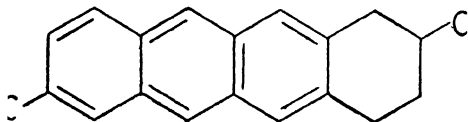
1,2-Benzo-8-ethyl-3,4,5,6-tetrahydroanthracene



M. P., °C

65-67²⁰

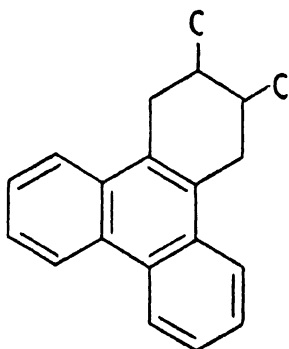
2,8-Dimethyl-1,2,3,4-tetrahydronaphthalene



M. P., °C

214¹⁸

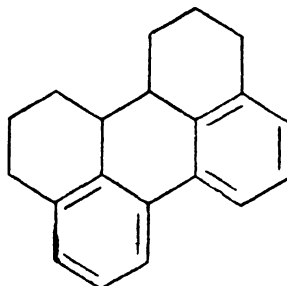
2,3-Dimethyl-1,2,3,4-tetrahydrotriphenylene



M. P., °C

158-160¹⁶

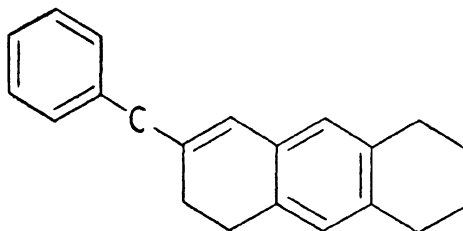
1,2,3,10,11,12,12a,12b-Octahydropyrene



M. P., °C

159-161⁴⁵119-120⁴⁴ $C_{21}H_{22}$

7-Benzyl-1,2,3,4,5,6-hexahydroanthracene

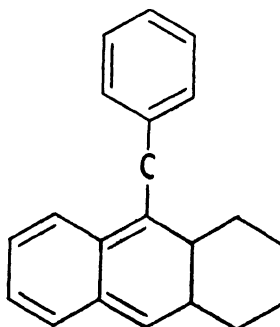


B. P., °C @ 760mm

255-258

13³⁵

9-Benzyl-1,2,3,4,4a,9a-hexahydroanthracene



B. P., °C @ 760mm
255-258

20²¹, 24

1-Methyl-7-isopropyl-x-isopropenyl-phenanthrene (a)

M. P., °C
64.5-65.5²⁸

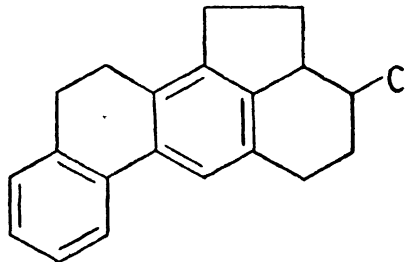
- (a) The structure of this compound was not clearly defined in the literature.

10-Isopropyl-x₁-tetrahydro-1,2-benzoanthracene (a)

M. P., °C
72.5-73.5¹⁷

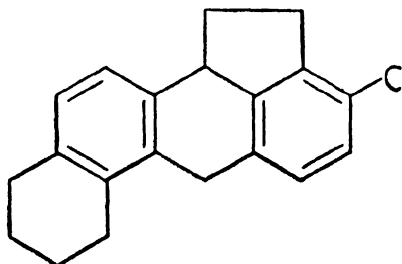
- (a) The structure of this compound was not clearly defined in the literature.

3-Methyl-2a,3,4,5,11,12-hexahydrocholanthrene



M. P., °C
157⁴⁰
156-157³⁶

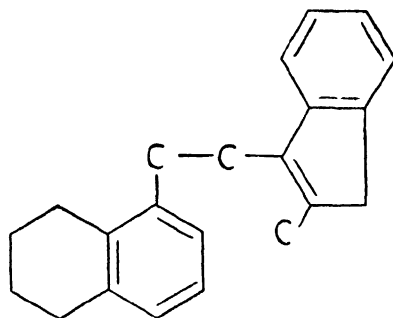
3-Methyl-6,7,8,9,10,12b-hexahydrocholanthrene



M. P., °C
160-160.5¹⁸

C₂₂H₂₄

1-(5',6',7',8'-Tetrahydronaphthyl)-2-[3''-(2''-methylindenyl)]-ethane

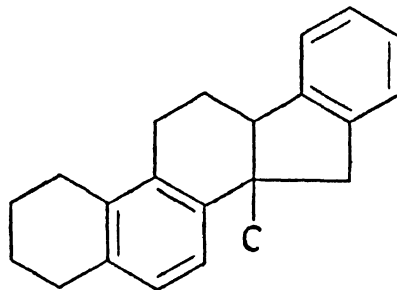


M. P., °C
73¹²

B. P., °C @ 760mm
190

0.3¹²

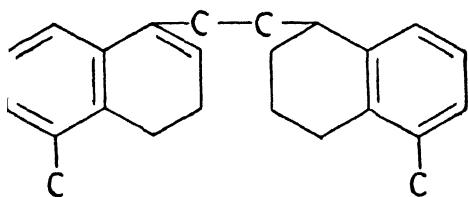
1-Methyl-1,2-(2',3'-indano)-1,2,3,4,5,6,7,8-octahydrophenanthrene



M. P., °C
123.5-124¹³

C₂₄H₂₈

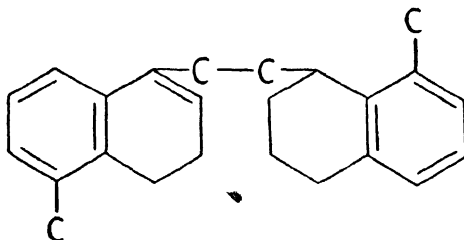
1-[1'-(5'-Methyl-3,4-dihydronaphthyl)]-2-[1''-(5''-methyl-1'',2'',3'',4''-tetrahydronaphthyl)]-ethane



B. P., °C @ 760mm
176-178

0.1³²

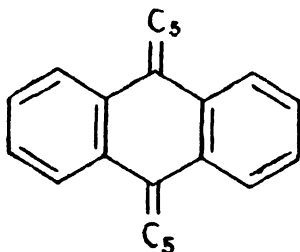
1-[1'-(5'-Methyl-3',4'-dihydronaphthyl)]-2-[1''-(8''-methyl-1'',2'',3'',4''-tetrahydronaphthyl)]-ethane



B. P., °C @ 760mm
185-186

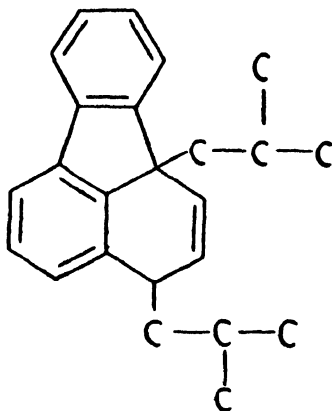
0.1³¹

9,10-Dipentylidene-9,10-dihydroanthracene



M. P., °C
103-108²⁶

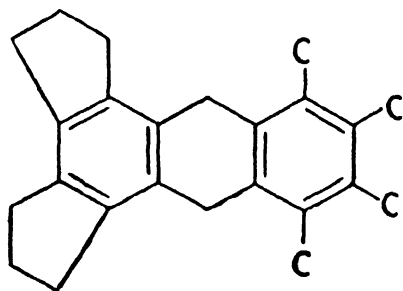
1,2-Benzo-2a,5-diisobutyl-2a,5-dihydroacenaphthylene (a)



M. P., °C
160²⁷

(a) The structure of this compound was not clearly defined in the literature.

5,6,7,8-Dicyclopentano-1,2,3,4-tetramethyl-9,10-dihydroanthracene



M. P., °C
255-257⁴

C₂₈H₃₀

2-(5,6-Dimethyl-3,4-dihydronaphthyl)-1'-(5',6'-dimethyl-1',2',3',4'-tetrahydronaphthyl)-methane

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VIII. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA

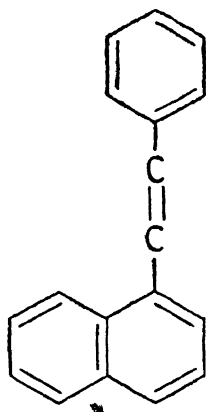


1. Naphthalene with Phenylalkenyl Substitutions
2. Anthracene and Phenanthrene Derivatives of Empirical Formula
 C_nH_{2n-22}
3. Cyclenoanthracenes, Cyclenophenanthrenes and Their Alkyl Derivatives
4. Benzofluorenes and Their Alkyl Derivatives
5. Pyrene and Its Alkyl Derivatives
6. Miscellaneous Polynuclear Aromatics of Empirical Formula C_nH_{2n-22}

1. NAPHTHALENE WITH PHENYLALKENYL SUBSTITUTIONS,
 C_nH_{2n-12}

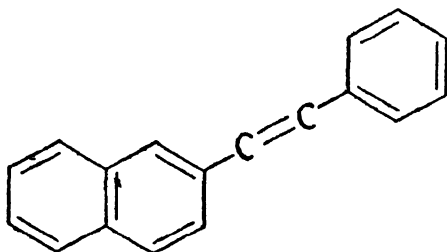
$C_{18}H_{14}$

1-Phenethenylnaphthalene



M. P., °C
 72.5-73.5²

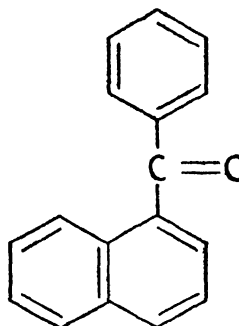
2-Phenethenylnaphthalene (a)



M. P., °C
 205-207¹²

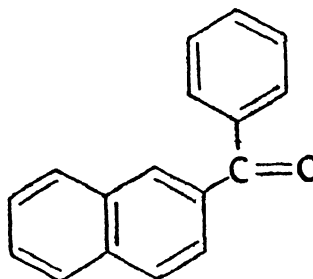
(a) The above formula was given for this compound, but the name given in the literature was "Phenyl- α -naphthylethylene."

1-Phenyl-1-(1'-naphthyl)-ethene



M. P., °C
 60^{1, 2}
 59.5-60¹¹
 B. P., °C @ 760mm
 350-355¹
 221-224
 195-196
 15¹⁰
 9¹¹

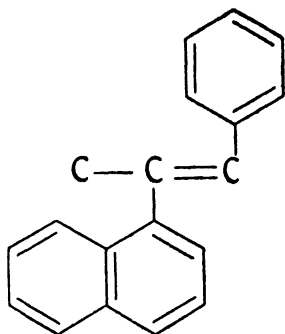
1-Phenyl-1-(2'-naphthyl)-ethene



M. P., °C
 52²
 B. P., °C @ 760mm
 220
 24²

$C_{19}H_{16}$

1-Phenyl-2-(1'-naphthyl)-propene-1



M. P., °C
139⁴

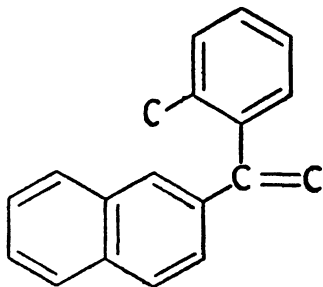
x-Phenyl-x-(1'-naphthyl)-propene-x
(a)

M. P., °C
55-61⁶

B. P., °C @ 760mm
232-236 22-23⁸

(a) The structure of this compound was not clearly defined in the literature.

1-o-Tolyl-1-(2'-naphthyl)-ethene



M. P., °C
66-66.5⁵

x-p-Tolyl-x-(1'-naphthyl)-ethene (a)

B. P., °C @ 760mm
224-226 20⁹

D_4^{20}
1.0693 21.5°⁹

(a) The structure of this compound was not clearly defined in the literature.

C₂₁H₂₀

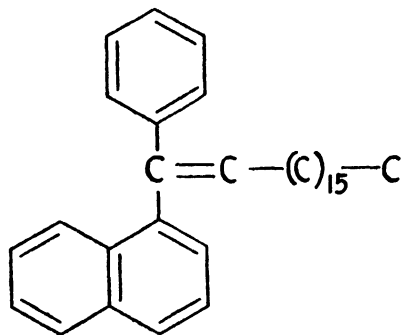
2-Methyl-3-phenyl-3-(x'-naphthyl)-butene-1 (a)

M. P., °C
85⁸

(a) The structure of this compound was not clearly defined in the literature.

C₃₄H₄₆

1-Phenyl-1-(1'-naphthyl)-octadecene-1



D_4^{20}
0.948 (a)⁷

n_D^{20}
1.5558⁷

(a) This constant is an extrapolated value.

References on Naphthalene with Phenyl-alkenyl Substitutions

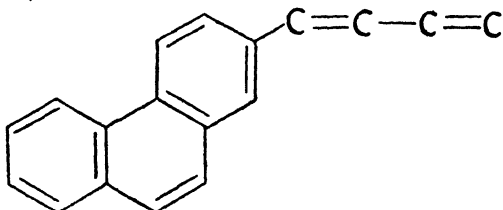
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3. Bergmann, E., and A. Bondi, Ber. **66**, 286 1933.
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2. ANTHRACENE AND PHENANTHRENE DERIVATIVES OF EMPIRICAL FORMULA C_nH_{2n-22}



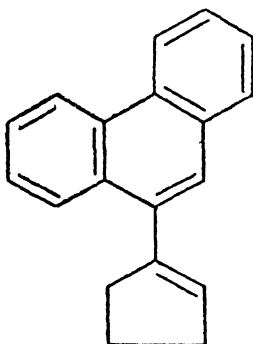
1-(2'-Phenanthryl)-butadiene-1,3



M. P., °C
125⁶



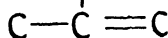
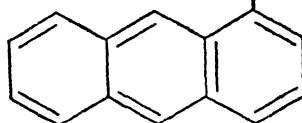
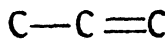
9-(Cyclopenten-1'-yl)-phenanthrene



B. P., °C @ 760mm
185 0.85¹

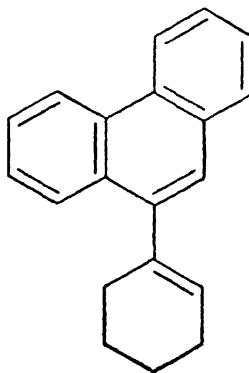


1,5-Diisopropenylanthrane



M. P., °C
121⁴

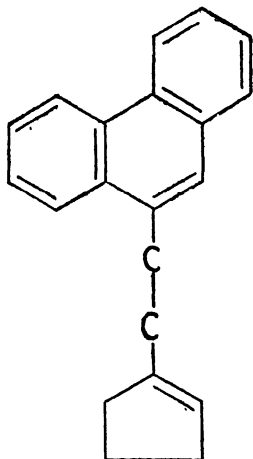
9-(Cyclohexen-1'-yl)-phenanthrene



M. P., °C
132¹

$C_{21}H_{20}$

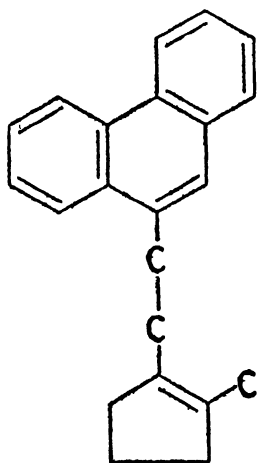
1-(Cyclopenten-1'-yl)-2-(9''-phenanthryl)-ethane



M. P., °C
105.5-107²

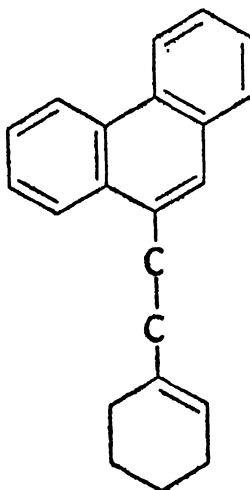
$C_{22}H_{22}$

1-(2'-Methylcyclopenten-1'-yl)-2-(9''-phenanthryl)-ethane



M. P., °C
73-75³

1-(Cyclohexen-1'-yl)-2-(9''-phenanthryl)-ethane

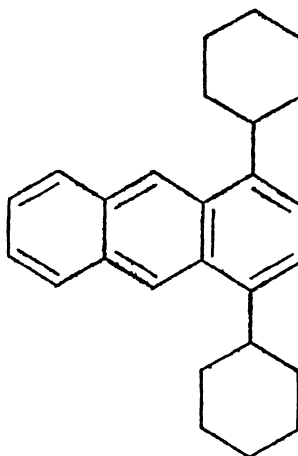


B. P., °C @ 760mm
205-206

0.4⁵

$C_{26}H_{30}$

1,4-Dicyclohexylantracene



M. P., °C
160-161³

*References on Anthracene and Phenanthrene
Derivatives of Empirical Formula*

C_nH_{2n-22}

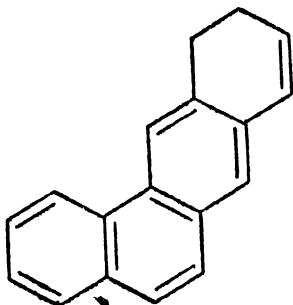
1. Bergmann, E., and F. Bergmann, J. Am. Chem. Soc. **59**, 1443 1937.
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3. CYCLENANTHRACENES, CYCLENOPHENANTHRENE, AND
THEIR ALKYL DERIVATIVES, C_nH_{2n-22}

$C_{18}H_{14}$

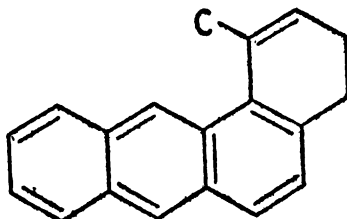
2,3-(Cyclohexen-5'-o)-phenanthrene



M. P., °C
112-113.5¹

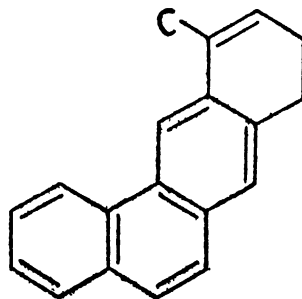
$C_{19}H_{16}$

1,2-(3'-Methylcyclohexen-3'-o)-
anthracene



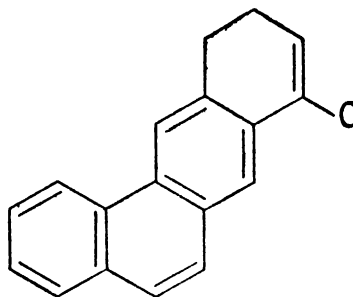
M. P., °C
74-75⁴

2,3-(3'-Methylcyclohexen-3'-o)-
phenanthrene



M. P., °C
80-80.6°

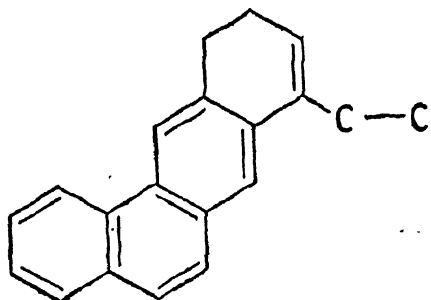
2,3-(6'-Methylcyclohexen-5'-o)-
phenanthrene



M. P., °C
118-118.5³

$C_{20}H_{18}$

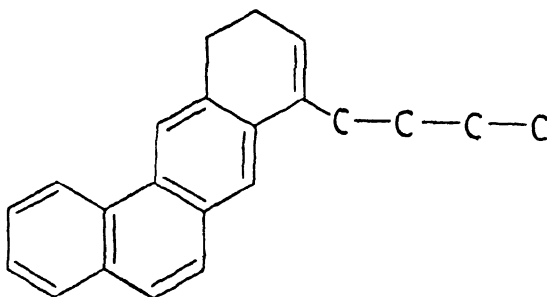
2,3-(6'-Ethylcyclohexen-5'-o)-
phenanthrene



M. P., °C
110-112²
109-110⁵

 $C_{22}H_{22}$

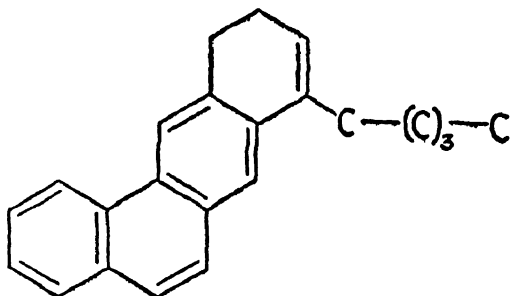
2,3-(6'-*n*-Butylcyclohexene-5'-o)-
phenanthrene



M. P., °C
69-70⁵

 $C_{23}H_{24}$

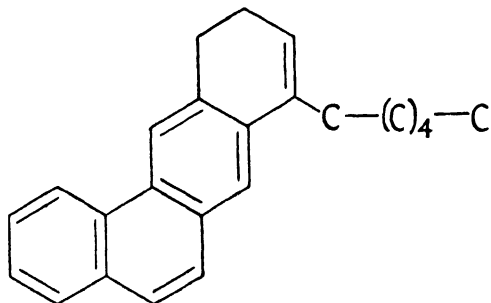
2,3-(6'-*n*-Pentylcyclohexen-5'-o)-
phenanthrene



M. P., °C
59-60⁵

$C_{24}H_{28}$

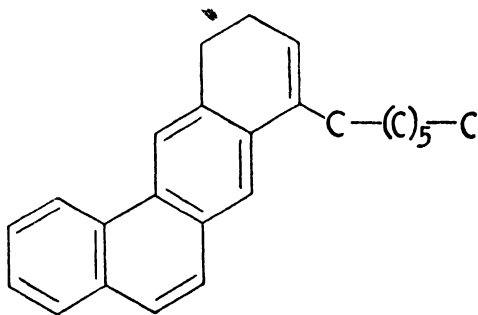
**2,3-(6'-*n*-Hexylcyclohexen-5'-o)-
phenanthrene**



M. P., °C
47-48⁵

 $C_{25}H_{28}$

**2,3-(6'-*n*-Heptylcyclohexen-5'-o)-
phenanthrene**



M. P., °C
53-54⁵

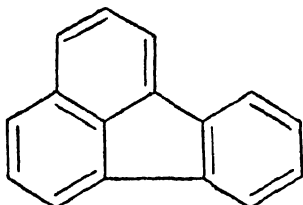
*References on Cyclenoanthracenes,
Cyclenophenanthrenes, and Their
Alkyl Derivatives*

1. Bachmann, W. E., J. Org. Chem. **3**, 434 1938-39.
2. Bachmann, W. E., and J. M. Chemerda, J. Am. Chem. Soc. **61**, 2358 1939.
3. Bachmann, W. E., and A. L. Wilds, J. Am. Chem. Soc. **60**, 624 1938.
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4. BENZOFLUORENES AND THEIR ALKYL DERIVATIVES, C_nH_{2n-22}



Benzo-[jk]-fluorene
(Fluoranthene)
(Idryl)



M. P., °C

110

110.0–110.7⁹110^{15, 16, 27, 28}109–110³¹109^{12, 13, 20, 30}108–109²⁵

B. P., °C @ 760mm

393¹⁰

382–383

749²²

250–251

60¹⁴

250

60³⁰

217

30¹⁴ D_4^{20}

1.0996

18.7°²⁷

1.1045

15.2°²⁷1.236 (a) (solid)²¹ n_D^{20}

1.62768

 $n_{H\alpha}^{18.7\ 27}$

1.63314

 $n_{H\alpha}^{15.2\ 27}$

1.66107

 $n_{H\beta}^{18.7\ 27}$

1.66772

 $n_{H\beta}^{15.2\ 27}$

1.63693

 $n_{He}^{18.7\ 27}$

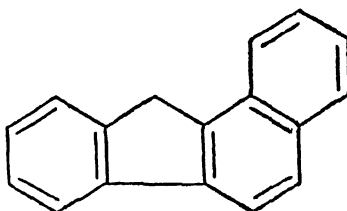
1.64269

 $n_{He}^{15.2\ 27}$

(a) The temperature of this determination was not given.



1,2-Benzofluorene
(Chrysofluorene)



M. P., °C

186.5

189–190²³188^{2, 17}187–188¹186–187¹⁸186¹⁹183–184⁶182–183⁷182⁸

B. P., °C @ 760mm

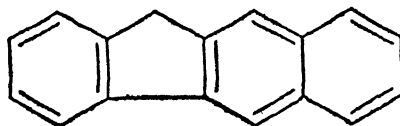
413¹⁷

398–400

758²³

2,3-Benzofluorene

(Isonaphthofluorene)



M. P., °C

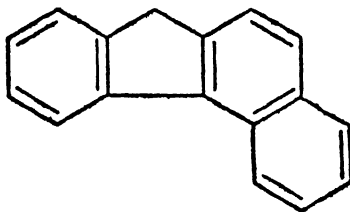
209²⁴208–209²³208^{3, 26}

B. P., °C @ 760mm

401–402

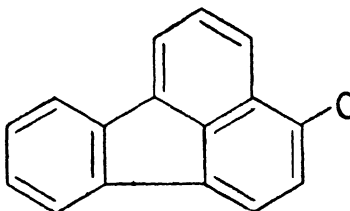
758²³

3,4-Benzofluorene



M. P., °C
124–125⁵

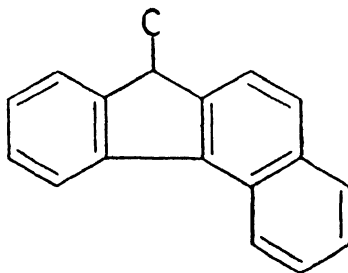
Benzo-[lm]-2-methylfluorene



M. P., °C
66²⁹

 $C_{18}H_{14}$

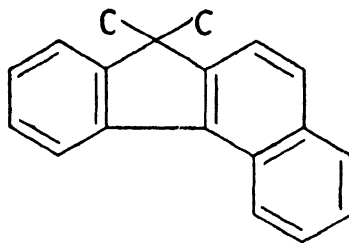
3,4-Benzo-9-methylfluorene



M. P., °C
80.8–82.0¹¹

 $C_{19}H_{16}$

3,4-Benzo-9,9-dimethylfluorene



M. P., °C
148–148.5⁴

References on Benzofluorenes and Their Alkyl Derivatives

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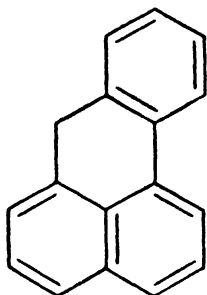
25. von Braun, J., and E. Rath, Ber. **61**, 956 **1928**.
 26. Weger, M., Z. angew. Chem. **22**, 338 **1909**.
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 28. Winterstein, A., and K. Schön, Z. physiol. Chem. **230**, 146 **1934**.
 29. Winterstein, A., K. Schön, and H. Vetter, Z. physiol. Chem. **230**, 158 **1934**.
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6. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{4n-12}



2,3-Benzophenalan

(Benzanthrene)
(Isochrysofluorene)



M. P., °C
84^{6, 14}
81–82¹⁸

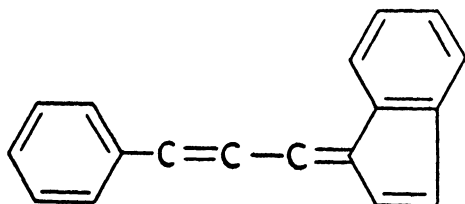
1,x-Naphthylenephenylenemethane
(a)

M. P., °C
76¹⁸

(a) The naphthylene bond may be in either the 2- or 8-position.

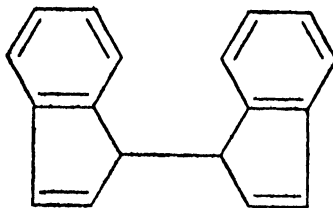


1-Phenyl-3-indenyldenepropene-1



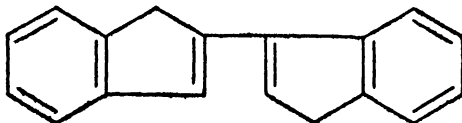
M. P., °C
190⁵⁰

1,1'-Biindenyl



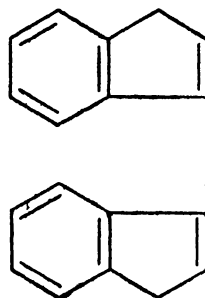
M. P., °C
99–100^{23, 39}
98⁴⁹

2,3'-Biindenyl

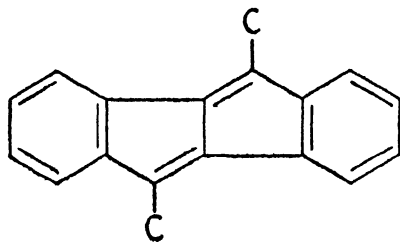


M. P., °C
57–58⁴⁸
56⁴⁶

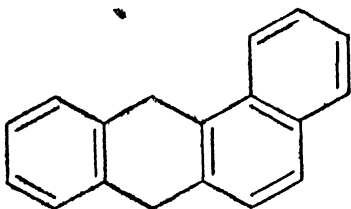
3,3'-Biindenyl



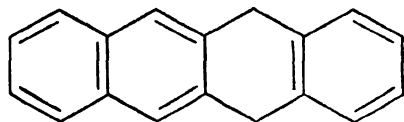
M. P., °C

130.5–131.5¹⁹130–131.5⁴⁹129.5–130.5⁴⁹**3,4,7,8-Dibenzo-2,6-dimethyl-
bicyclo-[3,3,0]-octadiene-1,5**

M. P., °C

212¹¹**1,2-Benzo-9,10-dihydroanthracene**

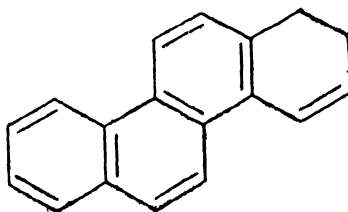
M. P., °C

112–112.5¹**5,12-Dihydronaphthacene**

M. P., °C

212–213²⁴212¹⁷207²⁸206–207¹⁷

B. P., °C @ 760mm

ca. 400¹⁷**1,2-Dihydrochrysene**

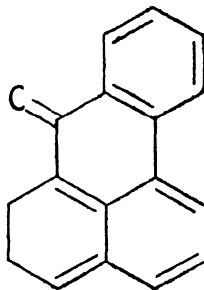
M. P., °C

182.5–184.5⁴**x,x-Dihydrochrysene (a)**

M. P., °C

167–169⁴⁴

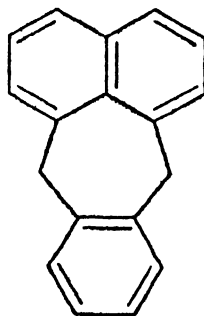
(a) The structure of this compound was not clearly defined in the literature.

**2,3-Benzo-1-methylene-8,9-dihydro-
phenalan**

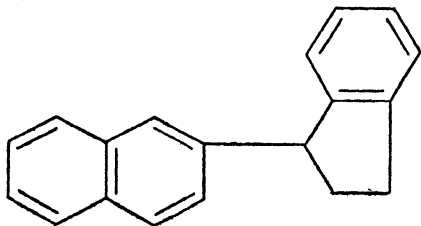
M. P., °C

155–156^{12, 13}**Naphtho-[1,8-ab]-benzo-[e]-cyclo-
heptane**

(Pleiadene)

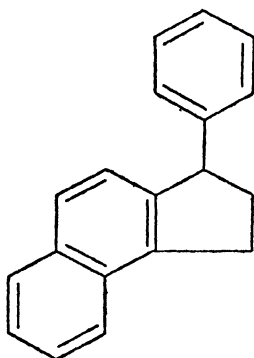


M. P., °C
116.5⁴⁵

C₁₈H₁₆**2-(1'-Indanyl)-naphthalene**

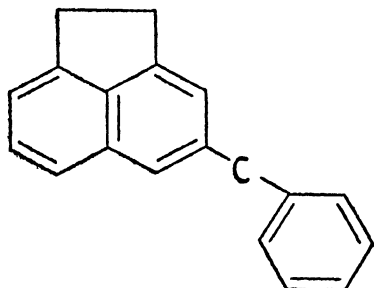
M. P., °C
52-53²¹
47⁵²

B. P., °C @ 760mm
229-230 13⁵²

1-Phenyl-4,5-benzointhane

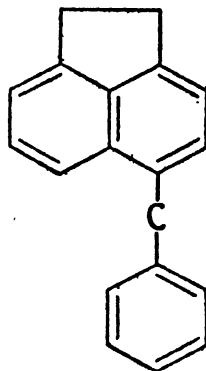
M. P., °C
79⁵²

B. P., °C @ 760mm
226-229 13⁵²

4-Benzylacenaphthene

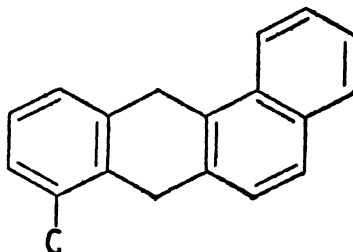
M. P., °C
45-46²⁶

B. P., °C @ 760mm
260-265 20²⁶

5-Benzylacenaphthene

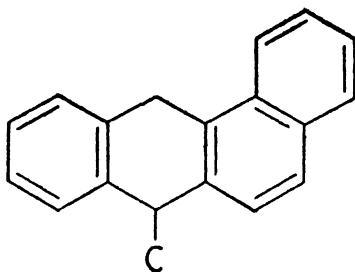
M. P., °C
112-113²⁵
111-112⁴²
110-111^{26, 27}

B. P., °C @ 760mm
ca. 340-345²⁵
210-215 13²⁷

1,2-Benzo-5-methyl-9,10-dihydro-anthracene

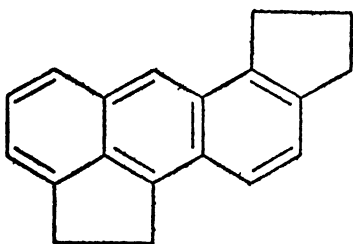
M. P., °C
128-129.5³

1,2-Benzo-10-methyl-9,10-dihydro-anthracene



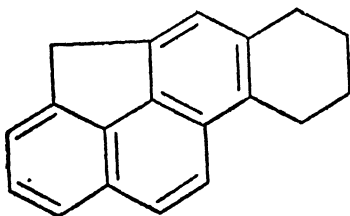
M. P., °C
94.4–94.9³¹

Dicyclopentano-[a,fg]-anthracene



M. P., °C
174–176³⁰

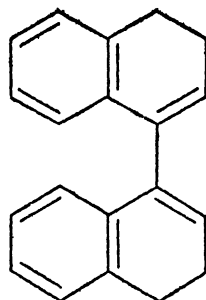
Cyclopentano-[mno]-1,2,3,4-tetrahydrochrysene



M. P., °C
129–129.4²⁹
127.5–128.5²⁹

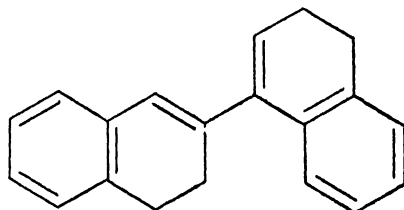
$C_{20}H_{18}$

3,4,3',4'-Tetrahydro-1,1'-binaphthyl



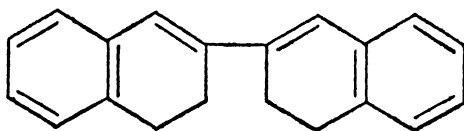
M. P., °C
141⁵⁴
140⁸
139–140⁴⁷

3,4,3',4'-Tetrahydro-1,2'-binaphthyl



M. P., °C
87⁵³

3,4,3',4'-Tetrahydro-2,2'-binaphthyl



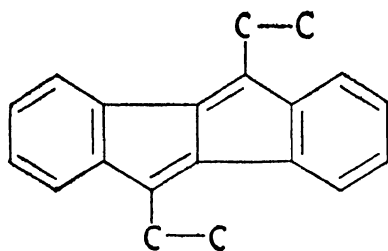
M. P., °C
156⁵¹
153⁵³

x,x-Dihydro-x-benzylfluorene (a)

M. P., °C
71⁴¹

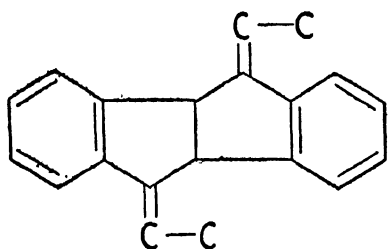
(a) The structure of this compound was not clearly defined in the literature.

3,4,7,8-Dibenzo-2,6-diethylbicyclo-[3,3,0]-octadiene-1,5



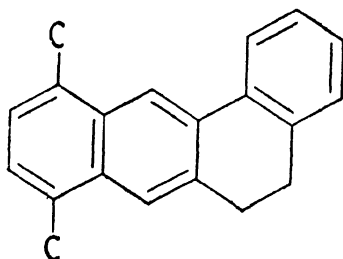
M. P., °C
154¹¹

**3,4,7,8-Dibenzo-2,6-diethylidene-
bicyclo-[3,3,0]-octane**



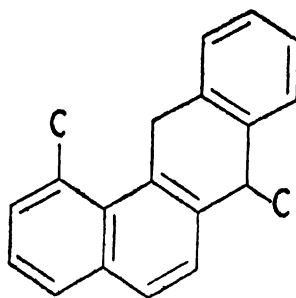
M. P., °C
199.5¹¹

**1,2-Benzo-5,8-dimethyl-3,4-dihydro-
anthracene**



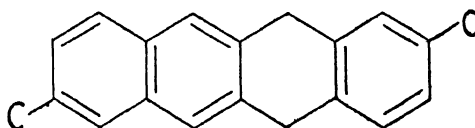
M. P., °C
82.2-82.8³²

**2,3-Benzo-1,5-dimethyl-1,4-dihydro-
phenanthrene**



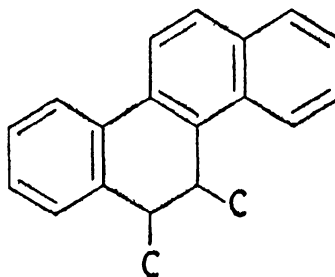
M. P., °C
108-109³⁵

**2,8-Dimethyl-5,12-dihydronaphtha-
cene**



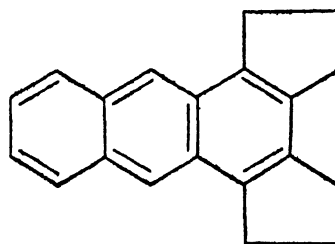
M. P., °C
217²²

5,6-Dimethyl-5,6-dihydrochrysene



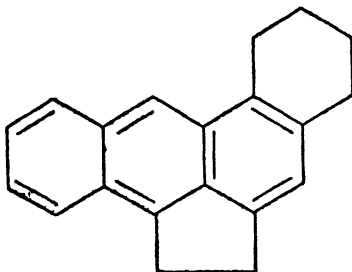
M. P., °C
104-104.5⁴⁰

1,2,3,4-Dicyclopentanoanthracene



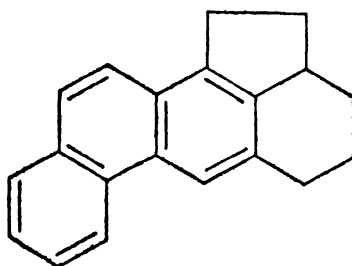
M. P., °C
146⁸

Cyclohexano-[a]-cyclopentano-[de]-
anthracene



M. P., °C
106–107³⁴

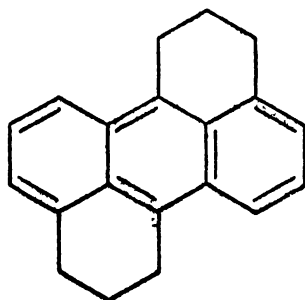
2a,3,4,5-Tetrahydrocholanthrene



M. P., °C
107 (a)²
101–101.5 (a)²

(a) These constants were determined
on different crystalline forms.

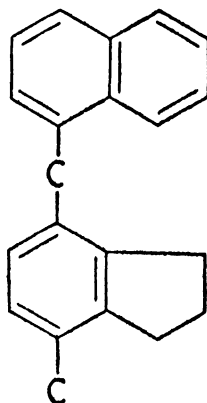
1,2,3,7,8,9-Hexahydroperylene



M. P., °C
189⁵⁶
182–185⁵⁸
183–184⁵⁷
183⁴³

$C_{21}H_{20}$

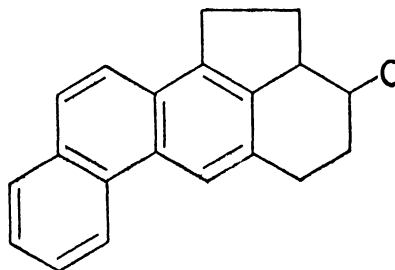
(1'-Naphthyl)-[4'-(7'-methylindanyl)]-
methane



B. P., °C @ 760mm
221–226

4³³

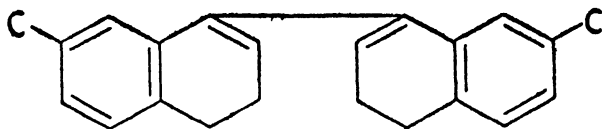
3-Methyl-2a,3,4,5-tetrahydrocholan-
threne



M. P., °C
97–99⁹

$C_{22}H_{22}$

7,7'-Dimethyl-3,4,3',4'-tetrahydro-
1,1'-binaphthyl



M. P., °C 162–163^{15, 16}

x₈-Octahydro-1,2,3,4-dibenzo-anthracene (a)

M. P., °C
129⁷

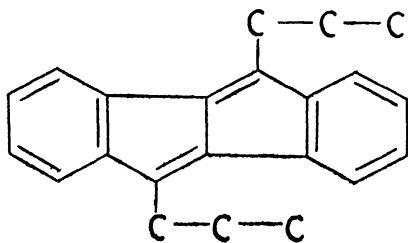
(a) The structure of this compound was not clearly defined in the literature.

x₈-Octahydro-1,2,5,6-dibenzoanthracene (a)

M. P., °C
188–190^{19, 20}

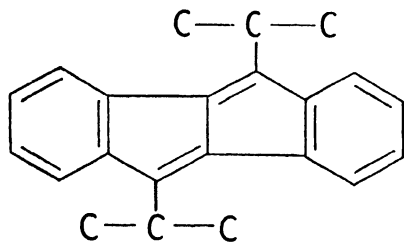
(a) The structure of this compound was not clearly defined in the literature.

3,4,7,8-Dibenzo-2,6-di-*n*-propylbicyclo-[3,3,0]-octadiene-1,5



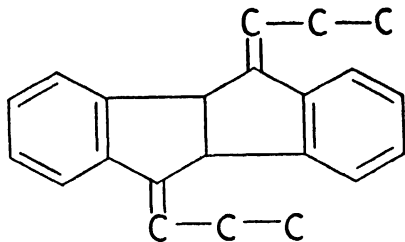
M. P., °C
135–136¹⁰

3,4,7,8-Dibenzo-2,6-diisopropylbicyclo-[3,3,0]-octadiene-1,5



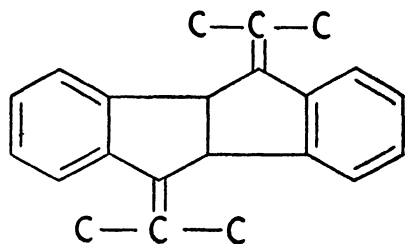
M. P., °C 178–179¹⁰

3,4,7,8-Dibenzo-2,6-di-*n*-propyldenebicyclo-[3,3,0]-octane



M. P., °C
157–158¹⁰

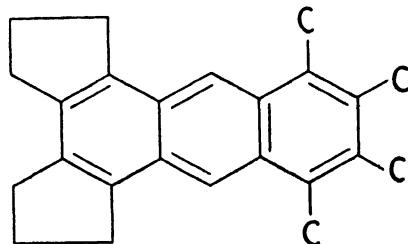
3,4,7,8-Dibenzo-2,6-diisopropyldenebicyclo-[3,3,0]-octane



M. P., °C
189¹⁰

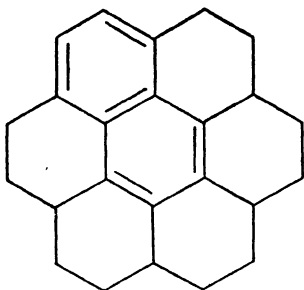
C₂₄H₂₆

1,2,3,4-Tetramethyl-5,6,7,8-dicyclopentanoanthracene



M. P., °C
296–297⁵

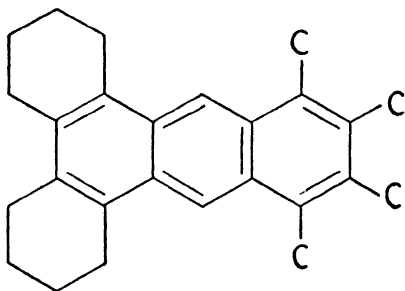
1,2,2a,3,4,4a,5,6,6a,7,8,8a,9,10-Tetradecahydrocoronene



M. P., °C
277–278³⁶



1,2,3,4-Tetramethyl-5,6,7,8-dicyclohexanoanthracene



M. P., °C
272–273⁶

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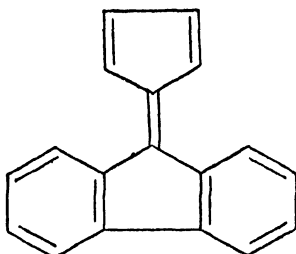
IX. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-24}

1. Fluorene Derivatives of Empirical Formula C_nH_{2n-24}
2. Dihydroanthracenes and Dihydrophenanthrenes with One Phenyl Substitution
3. 1,2-Benzoanthracene and Its Alkyl Derivatives
4. 3,4-Benzophenanthrene and Its Alkyl Derivatives
5. Naphthacene and Its Alkyl Derivatives
6. Chrysene and Its Alkyl Derivatives
7. Triphenylene and Its Alkyl Derivatives
8. Miscellaneous Polynuclear Aromatics of Empirical Formula C_nH_{2n-24}

1. FLUORENE DERIVATIVES OF EMPIRICAL FORMULA C_nH_{2n-24}



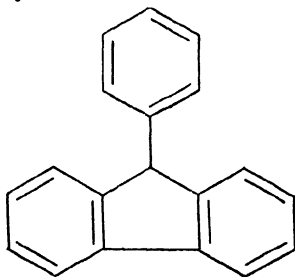
9-(Cyclopentadien-2',4'-ylidene)-fluorene



M. P., °C
133-135⁷



9-Phenylfluorene



M. P., °C
146
148.5¹⁷
147-148³⁵
146-148³⁷
147^{27, 37, 38}
146¹
145-146^{11, 12, 31}
145.5^{18, 19, 20}
145 (a)
144^{4, 15}

D_4^{20}

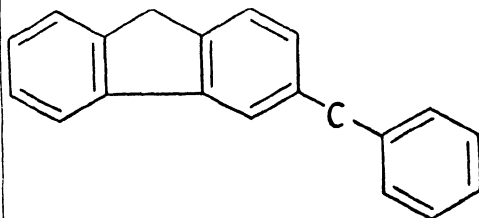
1.232

0°⁴¹

(a) The melting point 145 is found in references 23, 24, 25, 28, 30, 33, 40.

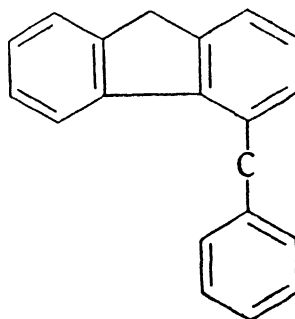


3-Benzylfluorene



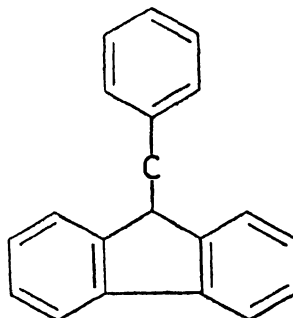
M. P., °C
106.5¹⁰
106⁸
104-106¹³
102¹⁴

4-Benzylfluorene



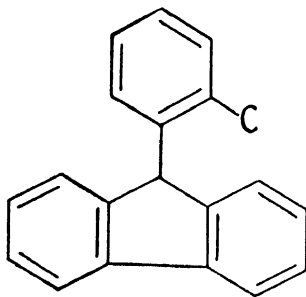
M. P., °C
77¹⁶

9-Benzylfluorene

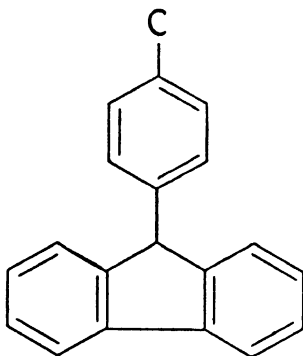


M. P., °C

133

134-135³⁹134³⁴133⁵131-132²130-131³²**9-*o*-Tolylfluorene**

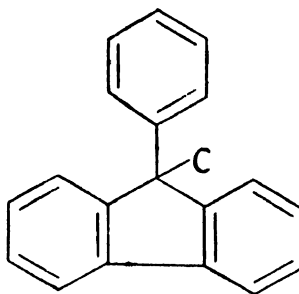
M. P., °C

133³⁶**9-*p*-Tolylfluorene**

M. P., °C

128 (a)¹⁸124²¹

(a) The structure of this compound was not clearly defined in the literature.

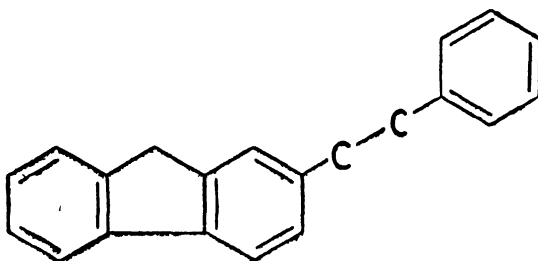
9-Methyl-9-phenylfluorene

M. P., °C

81-85³

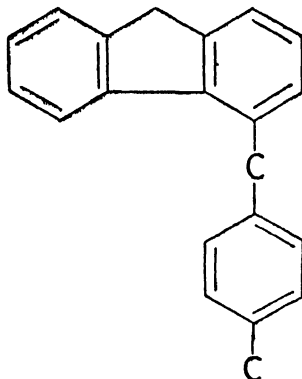
This series continued on next page

2-Phenethylfluorene



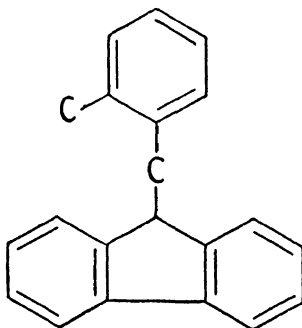
M. P., °C
113–114⁶

4-(4'-Methylbenzyl)-fluorene



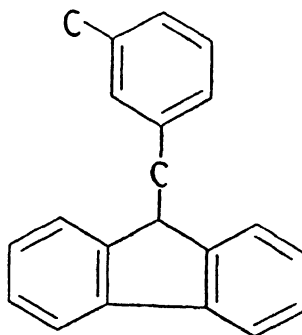
M. P., °C
72²⁶

9-(2'-Methylbenzyl)-fluorene



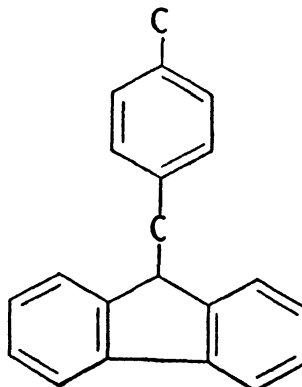
M. P., °C
71–72²⁹

9-(3'-Methylbenzyl)-fluorene



M. P., °C
111–112⁹

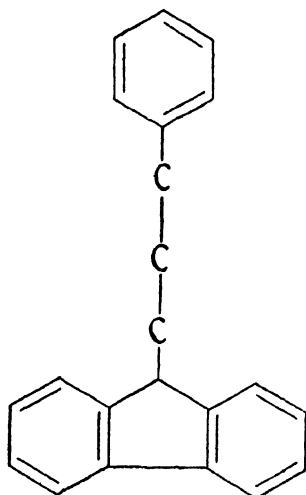
9-(4'-Methylbenzyl)-fluorene



M. P., °C
136–137²⁹



1-Phenyl-3-(9'-fluoryl)-propane



M. P., °C
75-76²
71²²

*References on Fluorene Derivatives of
Empirical Formula $C_{22}H_{20}$*

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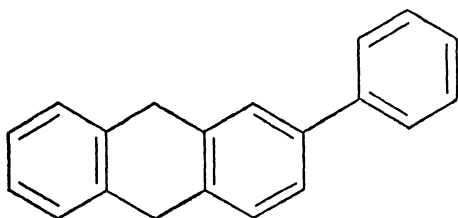
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2. DIHYDROANTHRACENES AND DIHYDROPHENANTHRENES WITH ONE PHENYL SUBSTITUTION, C_nH_{2n-24}

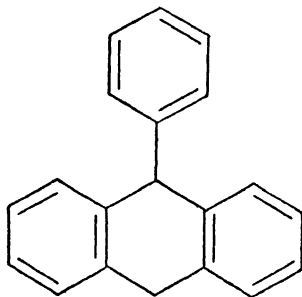


2-Phenyl-9,10-dihydroanthracene



M. P., °C
93-96¹⁶

9-Phenyl-9,10-dihydroanthracene



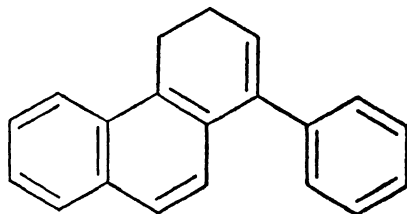
M. P., °C
90-91¹¹
90⁹
87¹⁵

x-Phenyl-x,x-dihydroanthracene (a)

M. P., °C
123¹⁵
120-120.5¹⁷

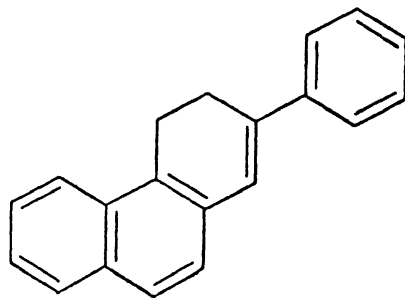
(a) The structure of this compound was not clearly defined in the literature.

1-Phenyl-3,4-dihydrophenanthrene



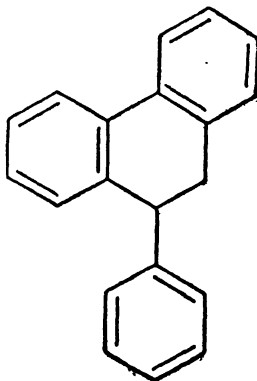
M. P., °C
98²

2-Phenyl-3,4-dihydrophenanthrene

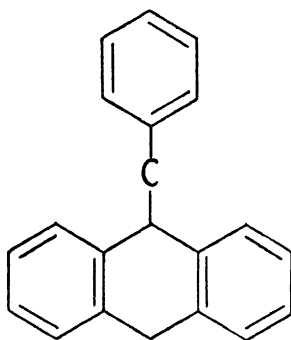


M. P., °C
150.6-151.0¹⁴

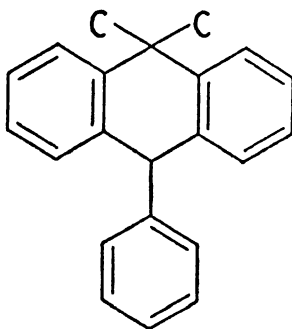
9-Phenyl-9,10-dihydrophenanthrene



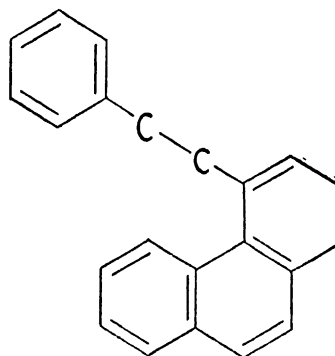
M. P., °C
121.5¹⁰
84⁴

 $C_{21}H_{18}$ **9-Benzyl-9,10-dihydroanthracene**

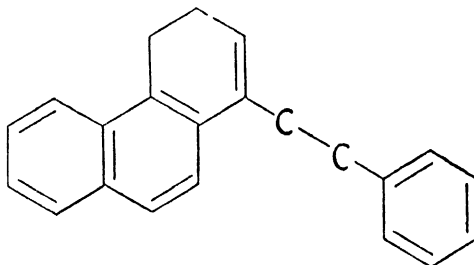
M. P., °C
119-120^{6, 7}
110-111¹

 $C_{22}H_{20}$ **9,9-Dimethyl-10-phenyl-9,10-dihydroanthracene**

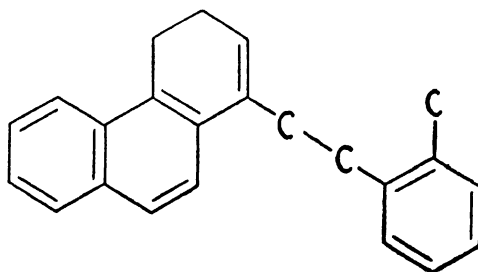
M. P., °C
145-146⁵

4-Phenethyl-1,2-dihydrophenanthrene

B. P., °C @ 760mm
180
0.01²
 n_D^{20}
1.6510
26°³

1-Phenethyl-3,4-dihydrophenanthrene

M. P., °C
62-63⁸
B. P., °C @ 760mm
185-187
0.5-1⁸

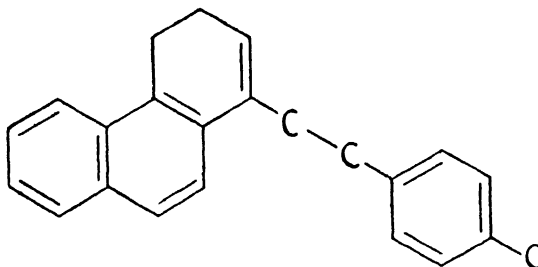
 $C_{23}H_{22}$ **1-o-Tolyl-2-[1'-(3',4'-dihydrophenanthryl)]-ethane**

M. P., °C

57–58⁸

B. P., °C @ 760mm

190–195

0.5–1⁸1-*p*-Tolyl-2-[1'-(3',4'-dihydrophenanthryl)]-ethane

M. P., °C

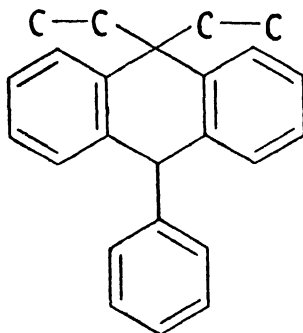
79.5–81⁸

B. P., °C @ 760mm

200–205

0.5–1.0⁸C₂₄H₂₄

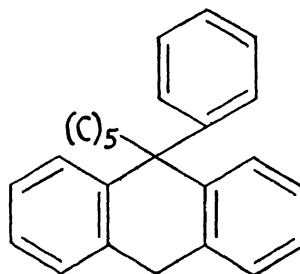
9,9-Diethyl-10-phenyl-9,10-dihydroanthracene



M. P., °C

135–136¹³C₂₅H₂₆

9-Pentyl-9-phenyl-9,10-dihydroanthracene



M. P., °C

85¹²

References on Dihydroanthracenes and Dihydrophenanthrenes with One Phenyl Substitution

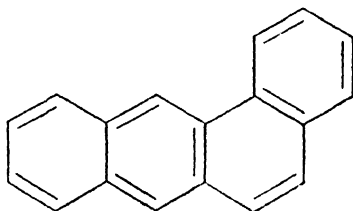
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3. 1,2-BENZOANTHRACENE AND ITS ALKYL DERIVATIVES, C_nH_{2n-14}



1,2-Benzoanthracene (Naphthanthracene)



M. P., °C

159.7

165–167¹⁷

161.4–161.8²¹

160.5–161²⁴

160–160.5³⁰

159.5–160.5²⁸

160⁴¹

159–160^{12, 27, 30}

158–160^{38, 42}

158.5–159.5¹⁶

159^{9, 36, 39}

158–159^{6, 7, 12, 22}

158–158.5¹

156–157¹⁰

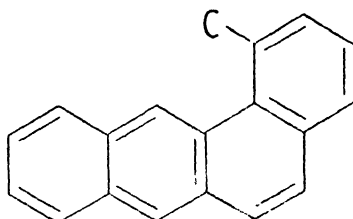
155–157^{23, 25}

D_4^{20}

1.245 (solid)²⁷



1,2-(3'-Methylbenzo)-anthracene



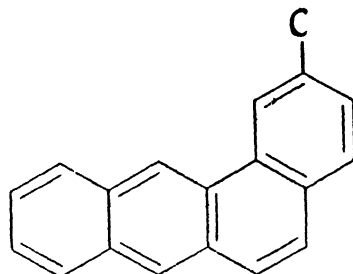
M. P., °C

138.5–139.2³⁴

138.5–139.0²¹

135.5–136.5⁴

1,2-(4'-Methylbenzo)-anthracene

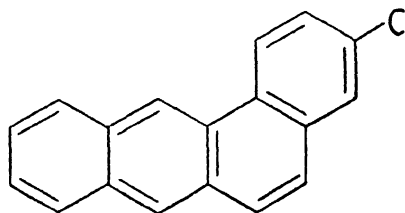


M. P., °C

149–150¹³

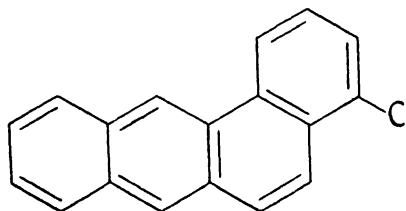
148–149³

1,2-(5'-Methylbenzo)-anthracene



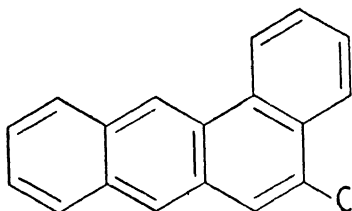
M. P., °C
160¹³

1,2-(6'-Methylbenzo)-anthracene



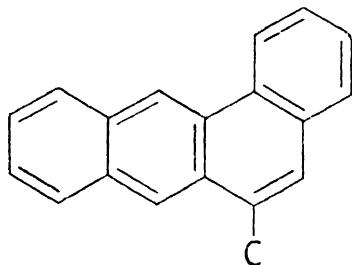
M. P., °C
194–195¹⁹

1,2-Benzo-3-methylantracene



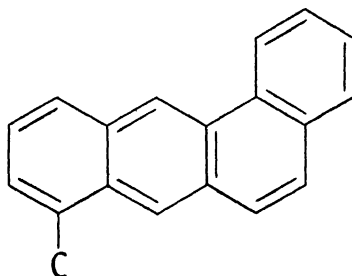
M. P., °C
155¹⁸
153–154¹¹

1,2-Benzo-4-methylantracene



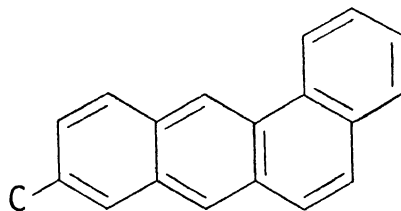
M. P., °C
124–126³³
124.5–125.5¹⁴
124.1–124.6³²

1,2-Benzo-5-methylantracene



M. P., °C
158
158–159.4³¹
158.5–159.1³³
157.5–158.5¹⁴
156.5–157⁵
154–156²³
 D_4^{20}
1.231 (solid)³⁷

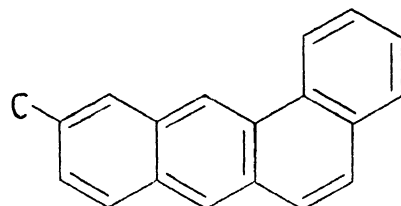
1,2-Benzo-6-methylantracene



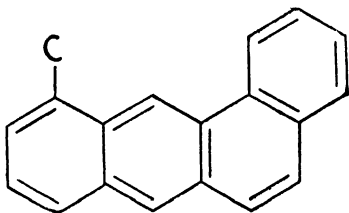
M. P., °C
150.5–151.5¹³
149–151.5²
127 (a)²²

(a) The structural formula indicates that this compound has a *para* bond in the 9,10-position.

1,2-Benzo-7-methylantracene



M. P., °C

182¹³181²⁰179.5–181²**1,2-Benzo-8-methylantracene**

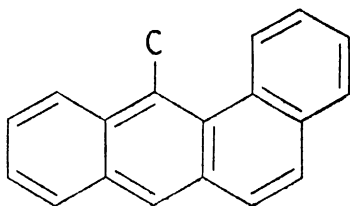
M. P., °C

145 (a)²²118–118.5 (b)³⁰117–118 (b)³¹117–118¹⁵114–117 (c)²

(a) The structural formula indicates that this compound has a *para* bond in the 9,10-position.

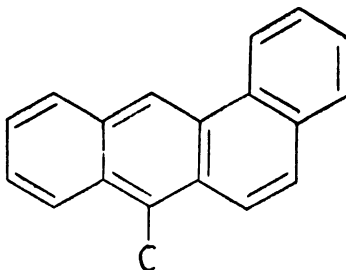
(b) This compound remelts at 113.5–114. The substance melting at 113.5–114 is considered a different modification in the literature.

(c) This compound remelts at 112–113.

1,2-Benzo-9-methylantracene

M. P., °C

138.5

138–139¹⁹138.4–138.8^{25, 40}138.0–138.8²¹137.5–138.5⁸**1,2-Benzo-10-methylantracene**

M. P., °C

140.4

140.5–141.5¹⁹140–141²⁹140.2–140.8³³140.0–140.5²¹139.5–140.5²⁶139–140^{3, 27}

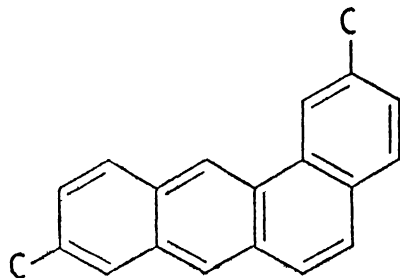
*References on $C_{18}H_{12}$ through $C_{19}H_{14}$
Compounds*

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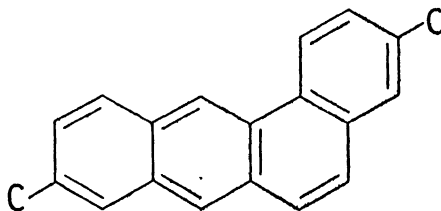
C₂₀H₁₆

1,2-(4'-Methylbenzo)-6-methyl-anthracene



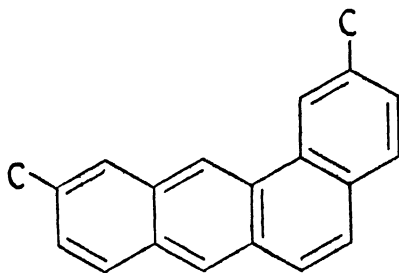
M. P., °C
161^a

1,2-(5'-Methylbenzo)-6-methyl-anthracene



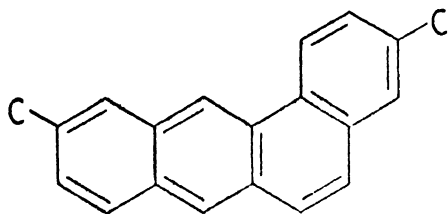
M. P., °C
186-187^a

1,2-(4'-Methylbenzo)-7-methyl-anthracene



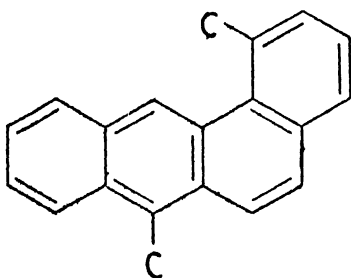
M. P., °C
236^a

1,2-(5'-Methylbenzo)-7-methyl-anthracene



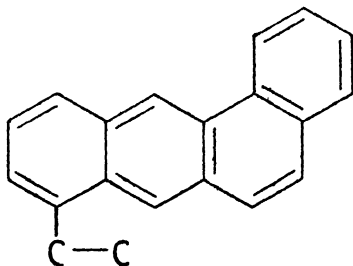
M. P., °C
189-190⁶

1,2-(3'-Methylbenzo)-10-methyl-anthracene



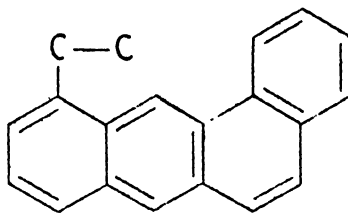
M. P., °C
124-125²¹

1,2-Benzo-5-ethylanthracene



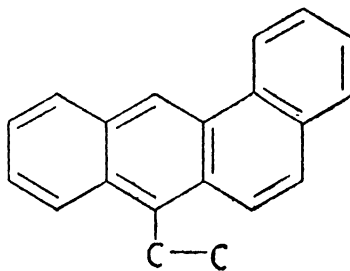
M. P., °C
120¹²
118-119³

1,2-Benzo-8-ethylanthracene



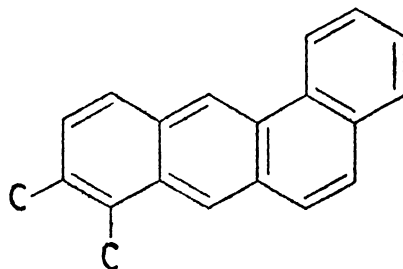
M. P., °C
78-79 (a)¹⁷
(a) This compound remelts at 82.5-83.

1,2-Benzo-10-ethylanthracene

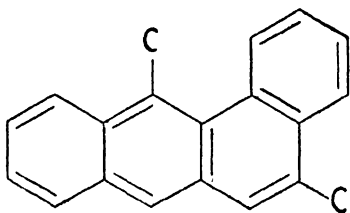


M. P., °C
113.5-114¹⁶
112-113¹⁶
112.4-112.8¹³

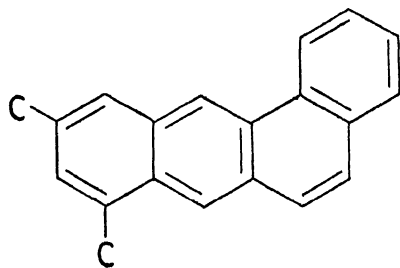
1,2-Benzo-5,6-dimethylantracene



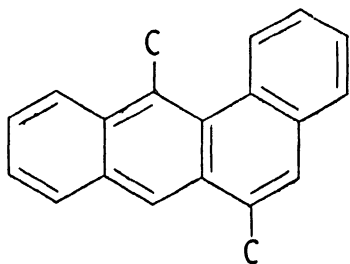
M. P., °C
187-188^{1, 9}

1,2-Benzo-3,9-dimethylantracene

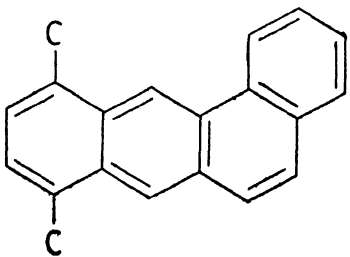
M. P., °C
93–93.5²²

1,2-Benzo-5,7-dimethylantracene

M. P., °C
124.5–125³

1,2-Benzo-4,9-dimethylantracene

M. P., °C
75.1–75.5¹⁹

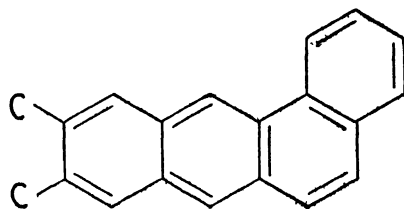
1,2-Benzo-5,8-dimethylantracene

M. P., °C

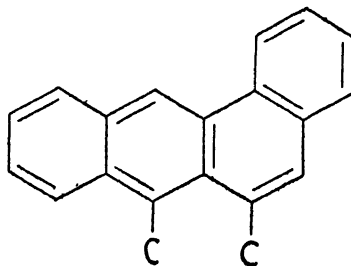
133.5–134.5³

131.2–131.4 (a)¹⁷

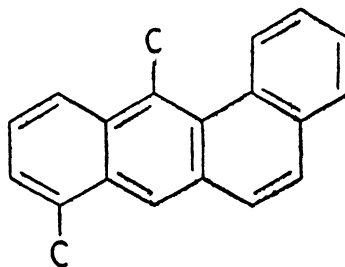
(a) This compound remelts at 134.4–134.7.

1,2-Benzo-6,7-dimethylantracene

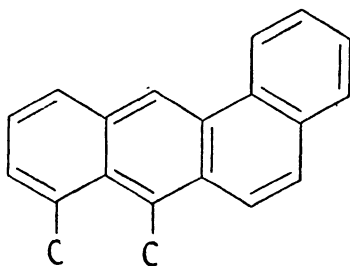
M. P., °C
174⁶
173–174⁵

1,2-Benzo-4,10-dimethylantracene

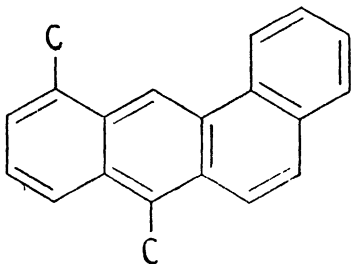
M. P., °C
114–114.4¹⁹

1,2-Benzo-5,9-dimethylantracene

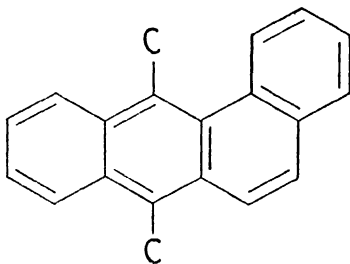
M. P., °C
135.0–135.5¹⁵
135–135.5²⁵

1,2-Benzo-5,10-dimethylantracene

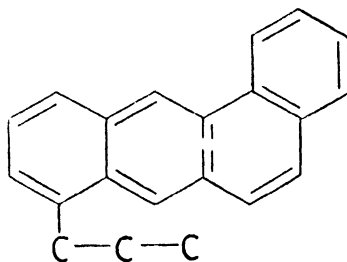
M. P., °C
147–147.5²⁰

1,2-Benzo-8,10-dimethylantracene

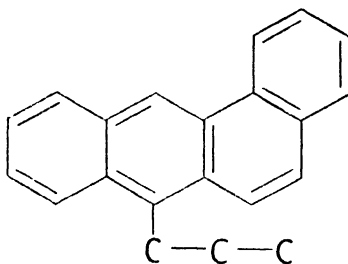
M. P., °C
145.5–146.5¹⁷

1,2-Dibenzo-9,10-dimethylantracene

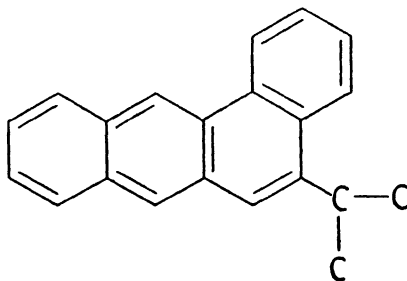
M. P., °C
122–123^{1, 2, 24}
122.6–122.9¹³
122.4–122.8²⁶

 $C_{21}H_{18}$ **1,2-Benzo-5-*n*-propylantracene**

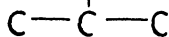
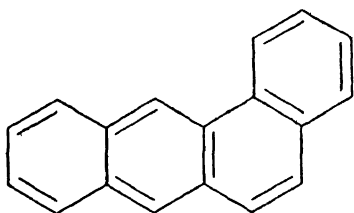
M. P., °C
90–92²
91–91.5¹⁰

1,2-Benzo-10-*n*-propylantracene

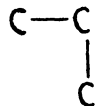
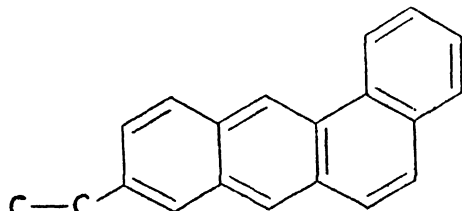
M. P., °C
107–108¹⁶

1,2-Benzo-3-isopropylantracene

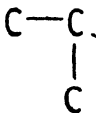
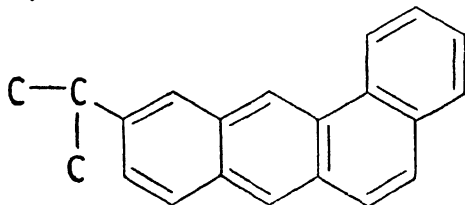
M. P., °C
92⁶

1,2-Benzo-5-isopropylantracene

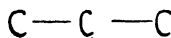
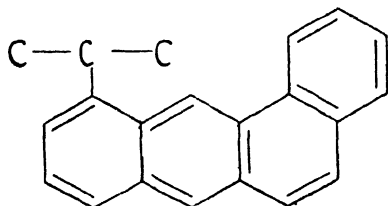
M. P., °C

111-112⁸**1,2-Benzo-6-isopropylantracene**

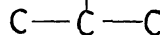
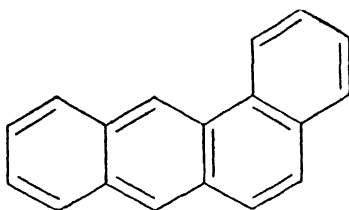
M. P., °C

132-133⁷131-132^{5, 6}**1,2-Benzo-7-isopropylantracene**

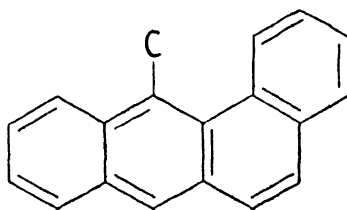
M. P., °C

125⁶**1,2-Benzo-8-isopropylantracene**

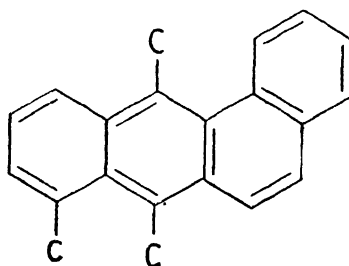
M. P., °C

97-98¹⁸**1,2-Benzo-10-isopropylantracene**

M. P., °C

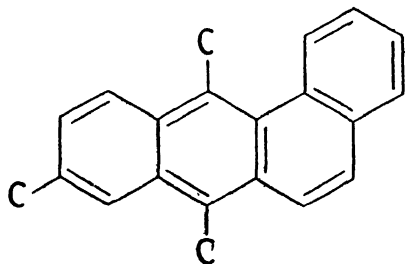
94-95⁶93-93.5¹⁶**1,2-Benzo-9-methyl-10-ethylanthracene**

M. P., °C

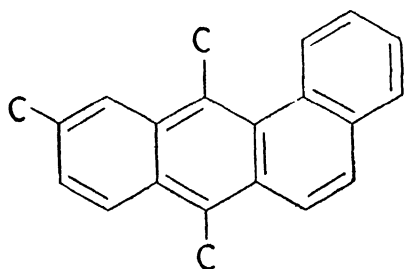
70-71.5²⁴**1,2-Benzo-5,9,10-trimethylantracene**

M. P., °C

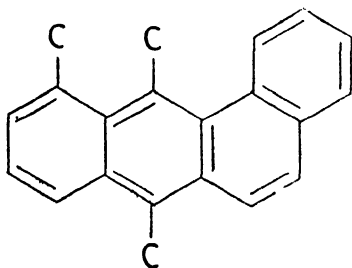
127-128^{1, 28}

1,2-Benzo-6,9,10-trimethylantracene

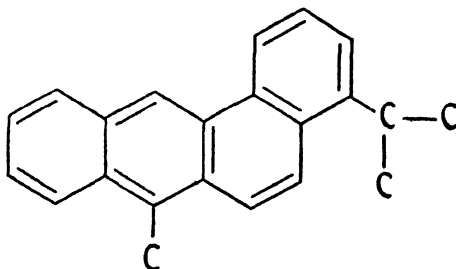
M. P., °C
157–158⁴

1,2-Benzo-7,9,10-trimethylantracene

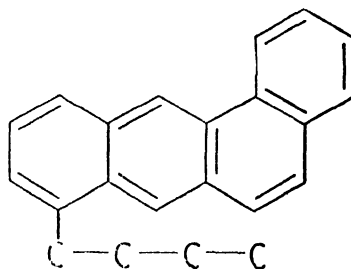
M. P., °C
99.5–100³

1,2-Benzo-8,9,10-trimethylantracene

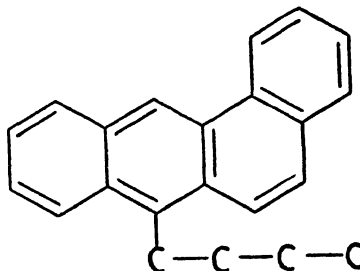
M. P., °C
102–103.5²

 $C_{22}H_{20}$ **1,2-(6'-Isopropylbenzo)-10-methylantracene**

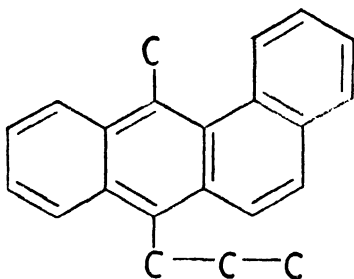
M. P., °C
98–99¹⁴

1,2-Benzo-5-*n*-butylanthracene

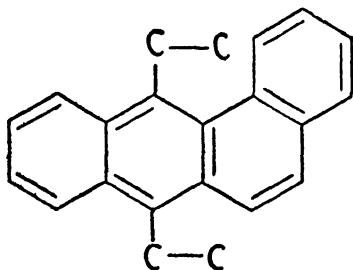
M. P., °C
81¹¹

1,2-Benzo-10-*n*-butylanthracene

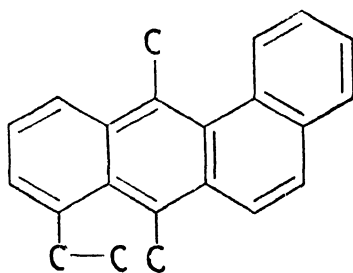
M. P., °C
96.8–97.5¹⁶
96.4–96.7¹⁸

1,2-Benzo-9-methyl-10-*n*-propylan-
thracene

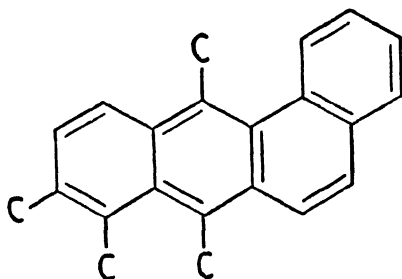
M. P., °C
99-101²⁴

1,2-Benzo-9,10-diethylan-
thracene

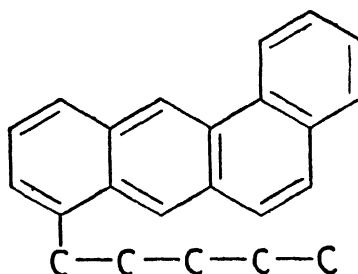
M. P., °C
98.5-99.5¹

1,2-Benzo-5-ethyl-9,10-dimethylan-
thracene

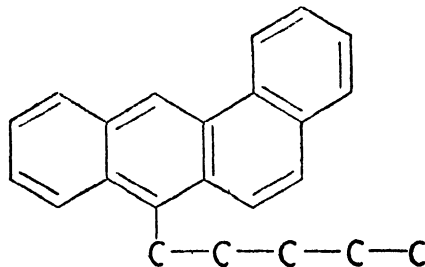
M. P., °C
107-108²

1,2-Benzo-5,6,9,10-tetramethylan-
thracene

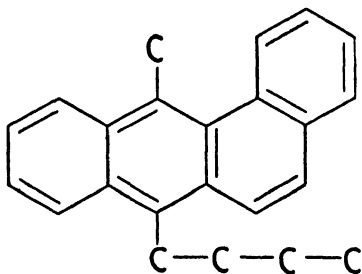
M. P., °C
132-133⁴

C₂₃H₂₂1,2-Benzo-5-*n*-pentylan-
thracene

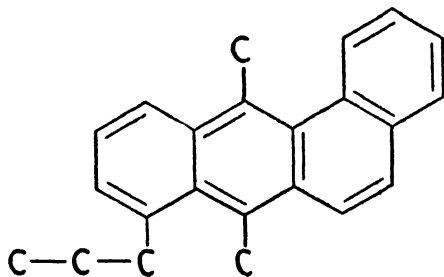
M. P., °C
93¹¹

1,2-Benzo-10-*n*-pentylan-
thracene

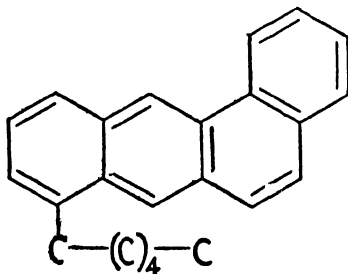
M. P., °C
82.5-83.5¹⁶
82.6-83.3¹³

1,2-Benzo-9-methyl-10-*n*-butylanthracene

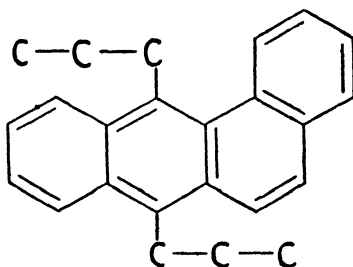
M. P., °C
71-72²⁴

1,2-Benzo-5-*n*-propyl-9,10-dimethylanthracene

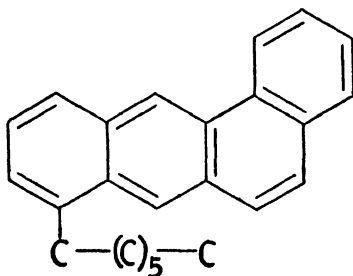
M. P., °C
84-85²

 $C_{24}H_{24}$ 1,2-Benzo-5-*n*-hexylanthracene

M. P., °C
72-73¹¹

1,2-Benzo-9,10-di-*n*-propylanthracene

M. P., °C
100.5-101²

 $C_{25}H_{26}$ 1,2-Benzo-5-*n*-heptylanthracene

M. P., °C
68¹¹

*References on $C_{20}H_{18}$ through $C_{25}H_{26}$
Compounds*

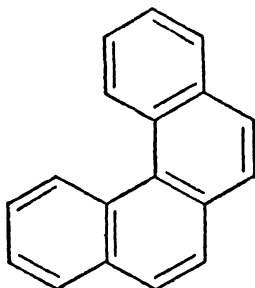
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4. 3,4-BENZOPHENANTHRENE AND ITS ALKYL DERIVATIVES, C_nH_{2n-24}



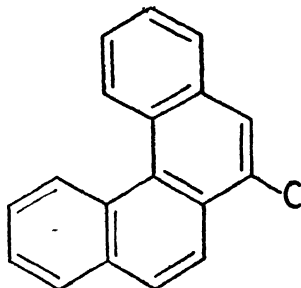
3,4-Benzophenanthrene



M. P., °C
68²
65.6-66.2⁸



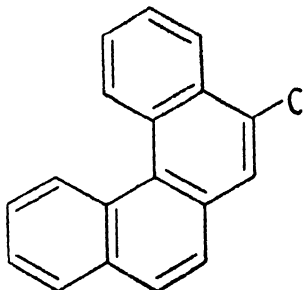
3,4-Benzo-1-methylphenanthrene



M. P., °C
77-78⁷
B. P., °C @ 760mm
210

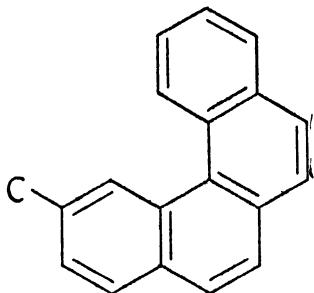
0.4⁷

3,4-Benzo-2-methylphenanthrene



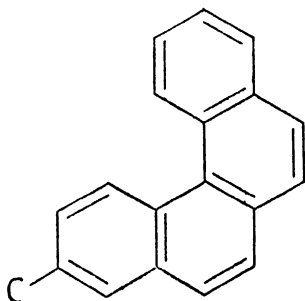
M. P., °C
69.5–70⁵

3,4-Benzo-6-methylphenanthrene



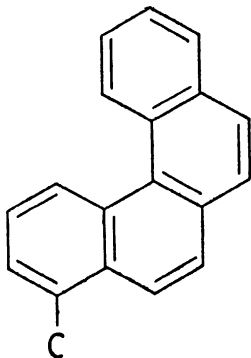
M. P., °C
80–81⁶

3,4-Benzo-7-methylphenanthrene



M. P., °C
54–54.5⁶

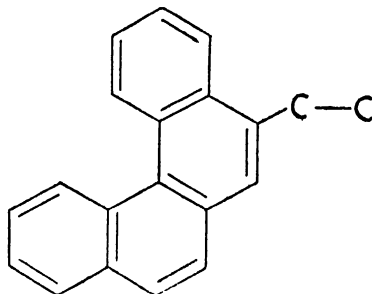
3,4-Benzo-8-methylphenanthrene



M. P., °C
65–66⁶

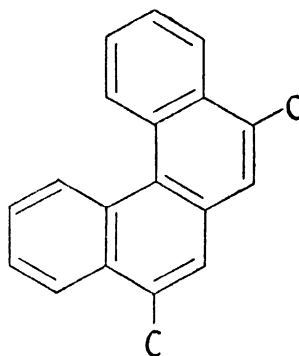
$C_{20}H_{16}$

3,4-Benzo-2-ethylphenanthrene



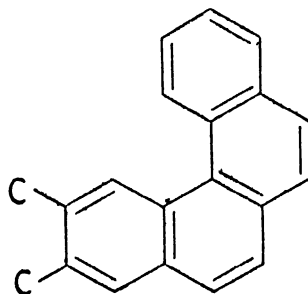
M. P., °C
50.4–51.2⁹

3,4-Benzo-2,9-dimethylphenanthrene

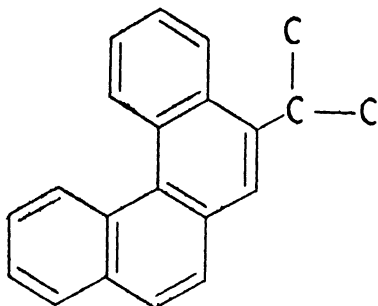


M. P., °C
130.6–131.0⁸

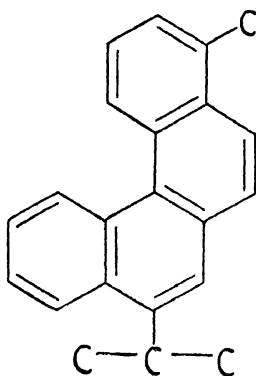
3,4-Benzo-6,7-dimethylphenanthrene



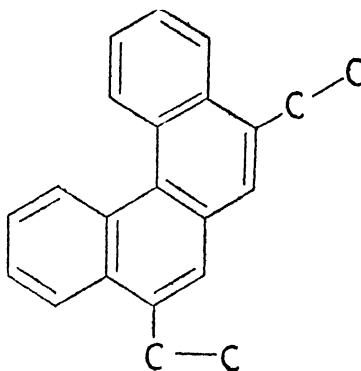
M. P., °C
94.5–95.0⁴
94.5–95³

**3,4-Benzo-2-isopropylphenanthrene**

M. P., °C
91.5–92.5⁷

**3,4-(6'-Methylbenzo)-9-isopropylphenanthrene**

M. P., °C
98–99¹

3,4-Benzo-2,9-diethylphenanthrene

M. P., °C
106.4–107.0⁸

References on 3,4-Benzophenanthrene and Its Alkyl Derivatives

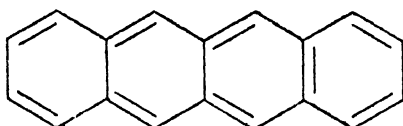
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5. NAPHTHACENE AND ITS ALKYL DERIVATIVES, C_nH_{2n-24}**Naphthacene**

(Tetracene)

(Chrysogene)

(Rubene)

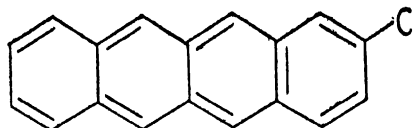


M. P., °C

343357^{3, 8}349¹²341.5–343.0⁷341^{1, 2}337^{14, 15}335–336⁹335^{11, 13}



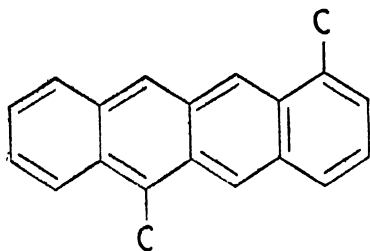
2-Methylnaphthacene



M. P., °C
350⁶

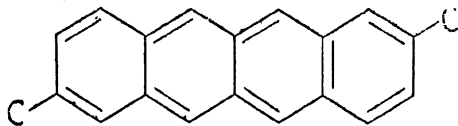


1,6-Dimethylnaphthacene



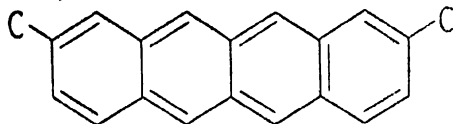
M. P., °C
138 139¹⁰

2,8-Dimethylnaphthacene



M. P., °C
365^{5, 6}

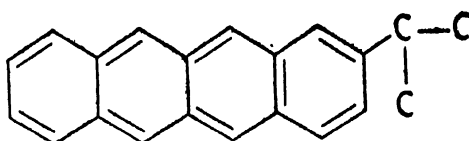
2,9-Dimethylnaphthacene



M. P., °C
362⁶



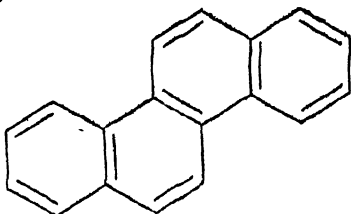
2-Isopropylnaphthacene



M. P., °C
273 274⁴

*References on Naphthacene and Its Alkyl
Derivatives*

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6. CHRYSENE AND ITS ALKYL DERIVATIVES, C_nH_{2n-24} **Chrysene**

M. P., °C

252

255–256⁷³255^{61, 66}254.5–255^{8, 12, 25}254.1–254.4⁹253.2–254.2⁵⁰254^{37, 46}253–254⁵⁹253.2–253.8²⁰252.5⁵³252⁵⁷251–252⁶²251⁷¹

250 (a)

249–250²³248–250^{13, 34}247.5–249.5⁷249^{24, 74}248–249^{17, 18, 62}247–249⁴246–248.5⁶³248^{36, 39, 54, 56, 68, 69}247–248^{1, 62}246–248²¹247¹⁶245^{40, 67, 72}

B. P., °C @ 760mm

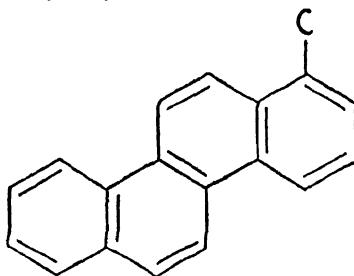
448^{41, 44, 65}436.0³⁵ D_4^{20} 1.273 (solid)⁸1.274 (solid)^{8, 42}

Additional Data

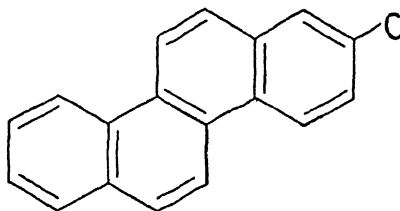
Sublimation Temp. (°C)

190 20mm³⁰169 in vac.⁴¹

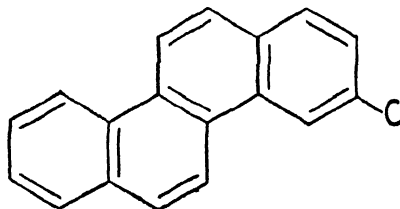
(a) The melting point 250 is found in references 6, 11, 15, 22, 30, 33, 41, 43, 47, 51, 52, 58, 64, 70, 75.

**1-Methylchrysene**

M. P., °C

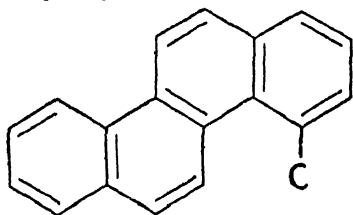
249.5–250⁵**2-Methylchrysene**

M. P., °C

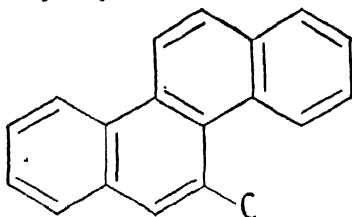
229–230⁴**3-Methylchrysene**

M. P., °C

170–170.5⁸

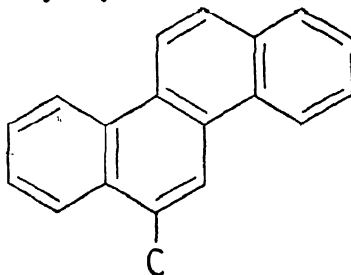
4-Methylchrysene

M. P., °C

151–151.5^{4, 27}151³⁹149–149.5⁵**5-Methylchrysene**

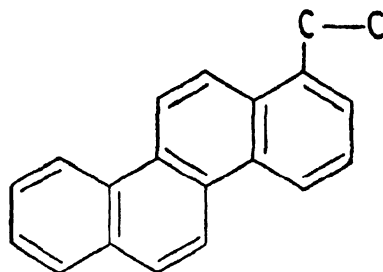
M. P., °C

117.8

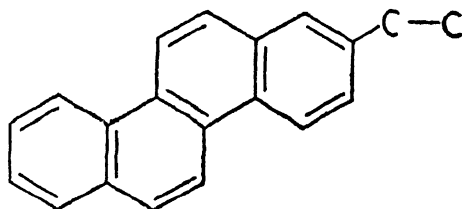
118–118.8²118 118.5³117.3–117.7²⁰116.8–117.6²⁸115–117⁴⁹**6-Methylchrysene**

M. P., °C

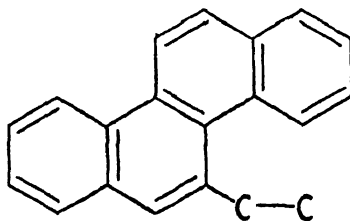
160.4

161.0–161.4⁴⁸160.4–160.9²⁰159–159.8²⁹159.5¹⁴ **$C_{20}H_{16}$** **1-Ethylchrysene**

M. P., °C

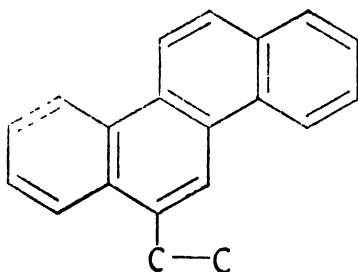
236³¹183.5–184⁵**2-Ethylchrysene**

M. P., °C

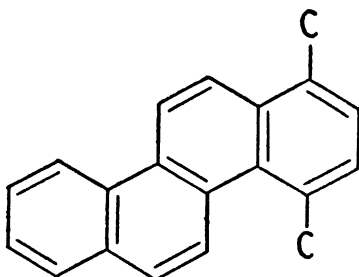
126^{31, 32}**5-Ethylchrysene**

M. P., °C

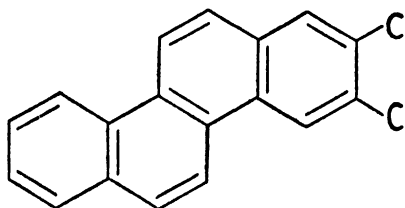
88–90⁴⁹

6-Ethylchrysene

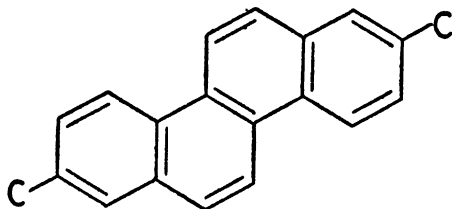
M. P., °C
126.4–126.8⁴⁸

1,4-Dimethylchrysene

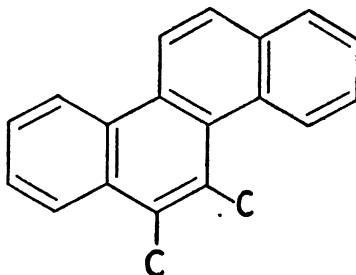
M. P., °C
141.5–142.5⁵

2,3-Dimethylchrysene

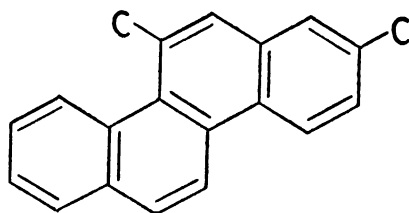
M. P., °C
215–215.3²⁵

2,8-Dimethylchrysene

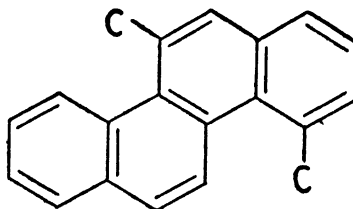
M. P., °C
218⁵⁵

5,6-Dimethylchrysene

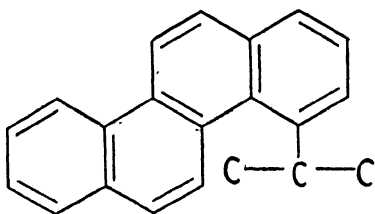
M. P., °C
128.6–129.8¹⁹
128.5–129.2²⁰
127–128⁵⁸

2,11-Dimethylchrysene

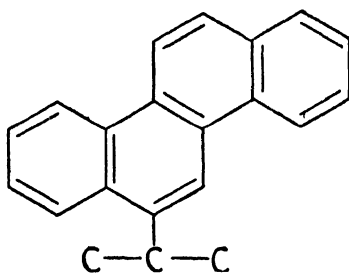
M. P., °C
237⁴⁵

4,11-Dimethylchrysene

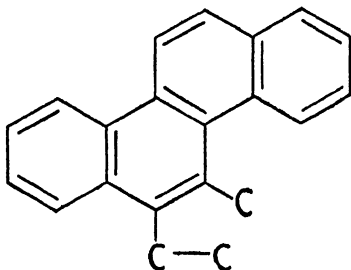
M. P., °C
147–147.5²⁶

$C_{21}H_{18}$ **4-Isopropylchrysene**

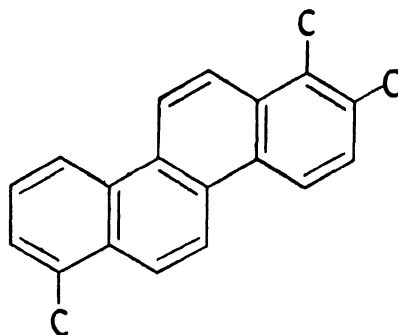
M. P., °C
227¹⁹

6-Isopropylchrysene

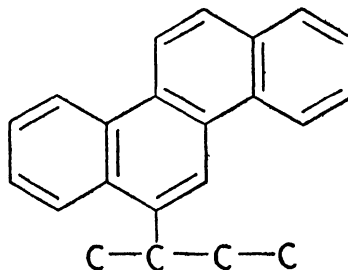
M. P., °C
137¹⁰

5-Methyl-6-ethylchrysene

M. P., °C
125.5–126.5¹⁴

1,2,7-Trimethylchrysene

M. P., °C
281–282⁶⁰

 $C_{22}H_{20}$ **6-sec-Butylchrysene (a)**

M. P., °C
100¹⁰

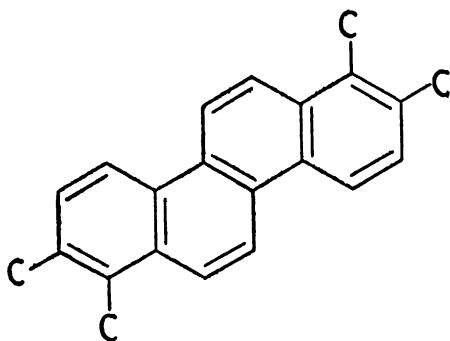
(a) The structure of this compound was not clearly defined in the literature.

x,x-Diethylchrysene (a)

M. P., °C
145³²

(a) The structure of this compound was not clearly defined in the literature.

1,2,7,8-Tetramethylchrysene



M. P., °C
298–299⁶⁰

*References on Chrysene and Its Alkyl
Derivatives*

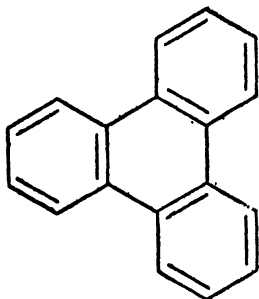
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7. TRIPHENYLENE AND ITS ALKYL DERIVATIVES, C_nH_{2n-24}



Triphenylene

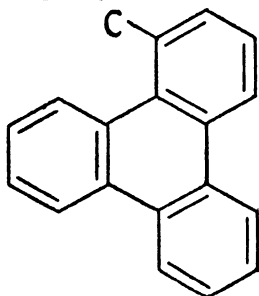


M. P., °C
198

200⁵
199¹
198-198.5^{11, 13}
198^{4, 12}
197.7-198¹⁷
197.5-197.7⁷
196.5-197.5³
197¹⁶
196-197^{13, 14}
196.5¹⁰
196^{11, 15}
195⁶

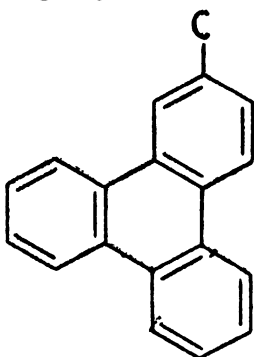
B. P., °C @ 760mm
425¹

$C_{19}H_{14}$
1-Methyltriphenylene



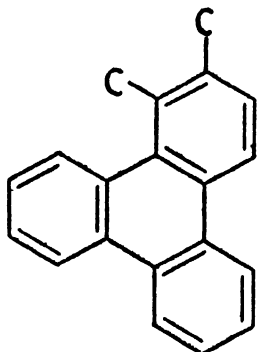
M. P., °C
93.4–94.2⁹
93–94³

2-Methyltriphenylene



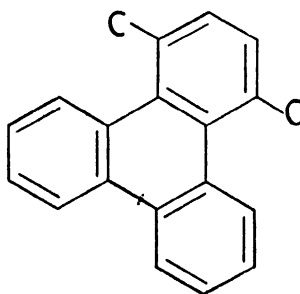
M. P., °C
102.6–103.6⁹
101–102²

$C_{20}H_{16}$
1,2-Dimethyltriphenylene



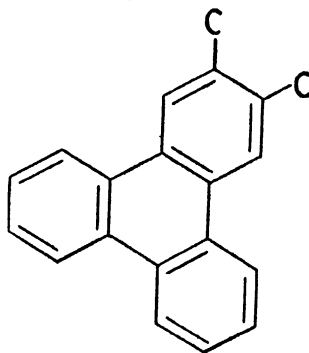
M. P., °C
86.8–87.4⁹

1,4-Dimethyltriphenylene



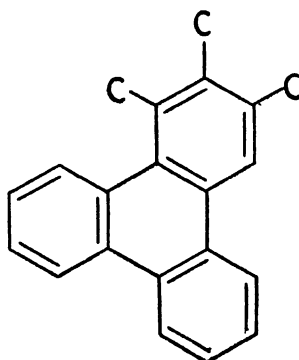
M. P., °C
108.4–109.2⁹

2,3-Dimethyltriphenylene



M. P., °C
156.7–157.2⁸

$C_{21}H_{18}$
1,2,3-Trimethyltriphenylene



M. P., °C
109.8–110.6⁸

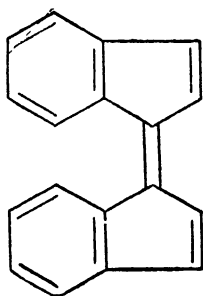
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8. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-24}

C₁₈H₁₂

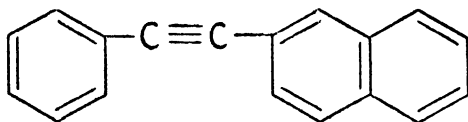
1,1'-Biindenylidene



M. P., °C
232–235 (a)⁴⁷

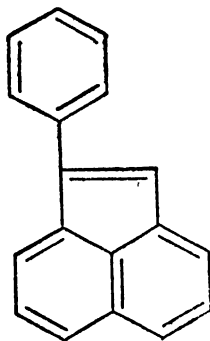
(a) This compound melts with decomposition.

Phenyl-(2-naphthyl)-ethyne



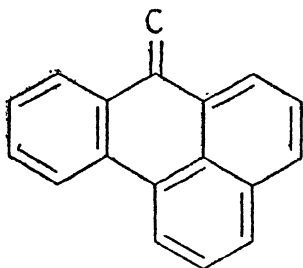
M. P., °C
117³⁷
115–116³⁸

1-Phenylacenaphthylene



M. P., °C
54–55³³

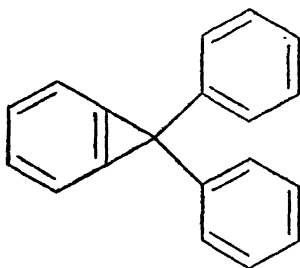
Benzo-[de]-9-methyleneanthracene



M. P., °C
225^{13, 14}

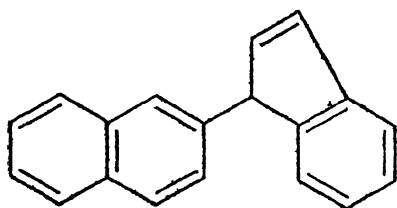
C₁₉H₁₄

1,1-Diphenyl-2,3-benzocyclopropane



M. P., °C
144^{44, 45}
138³⁴

2-(1'-Indenyl)-naphthalene

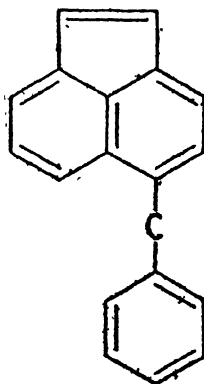


M. P., °C
88⁵⁰
87¹⁶

B. P., °C @ 760mm
246-250

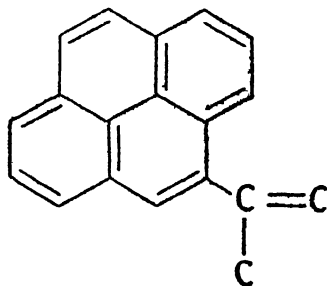
14⁵⁰

5-Benzylacenaphthylene



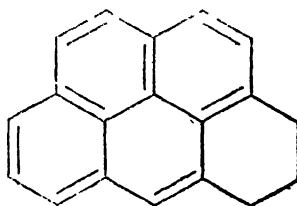
M. P., °C
104-105²⁰

3-Isopropenylpyrene

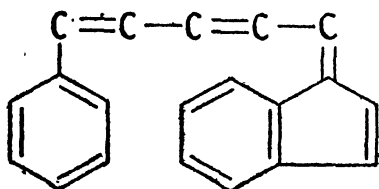


M. P., °C
61.5-62.5^{23, 24}

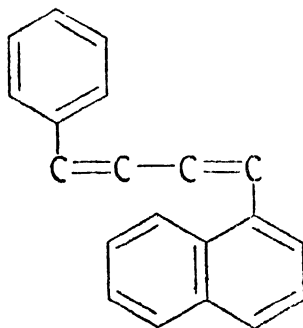
Cyclohexano-[cd]-pyrene



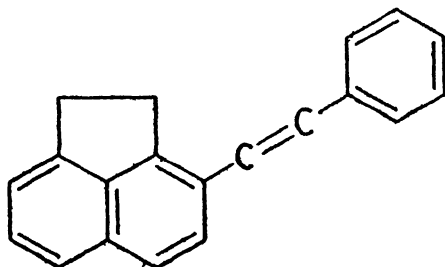
M. P., °C
107-108⁴⁸

$C_{20}H_{16}$ **1-Phenyl-5-(1'-indenylidene)-pentadiene-1,3**

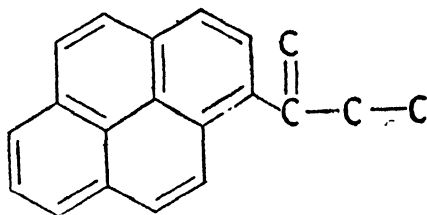
M. P., °C
182-183¹

1-Phenyl-4-(1'-naphthyl)-butadiene-1,3

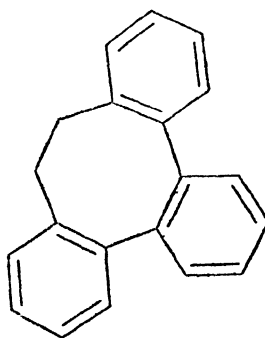
M. P., °C
109³⁰

3-Phenethenylacenaphthene

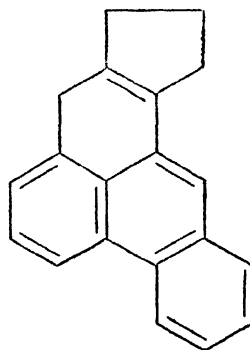
M. P., °C
93.2-94.0³⁵

3-(2'-Buten-1'-yl)-pyrene

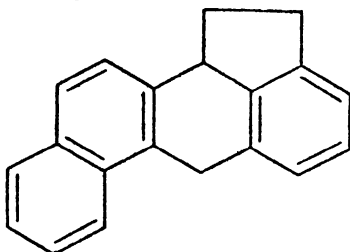
M. P., °C
75-76²⁵

1,2,3,4,5,6-Tribenzocyclooctane

M. P., °C
111-113⁴⁶

2,3-Cyclopentano-5,6-benzophenylene

M. P., °C
144.5-145²⁹

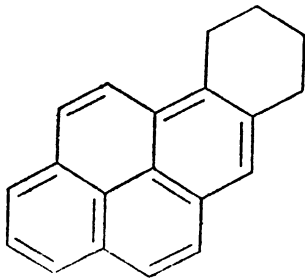
6,12b-Dihydrocholanthrene

M. P., °C
161.5–162.5³

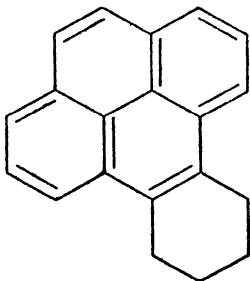
Cyclopentano-[x,x]-x,x-dihydrochrysene (a)

M. P., °C
153.2–153.5²⁷

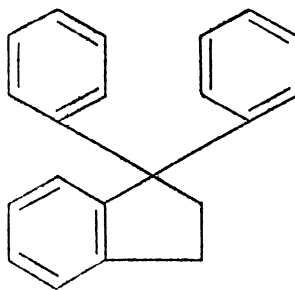
(a) The structure of this compound was not clearly defined in the literature.

1,2-Cyclohexanopyrene

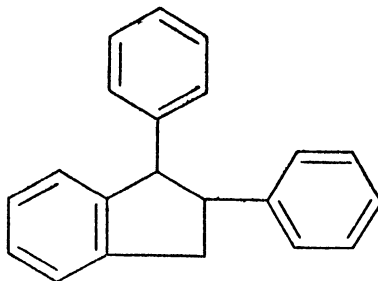
M. P., °C
135⁵²
128³⁶

4,5-Cyclohexanopyrene

M. P., °C
113²⁶

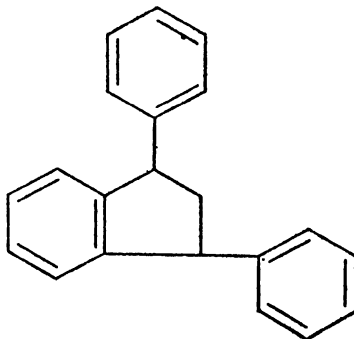
1,1-Diphenylindane

M. P., °C
67–68³¹
67³²

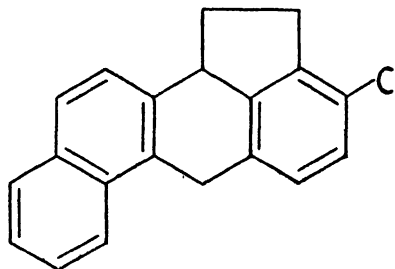
1,2-Diphenylindane

M. P., °C
123–124.5 (a)⁸
89 (a)⁸

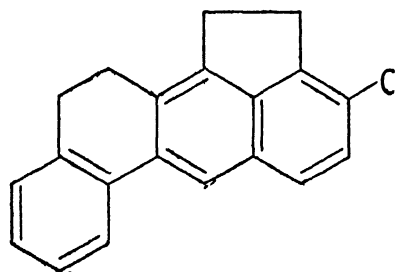
(a) These constants were determined on isomeric forms.

1,3-Diphenylindane

M. P., °C

156–157^{41, 64}155–156⁴²**meso-3-Methyl-6,12b-dihydrocholanthrene**

M. P., °C

138–139²⁸**3-Methyl-11,12-dihydrocholanthrene**

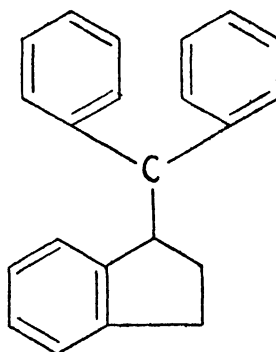
M. P., °C

154.5–155²⁸**3-Methyl-x,x-dihydrocholanthrene (a)**

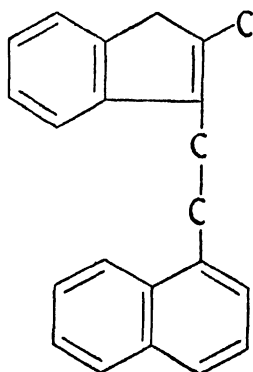
M. P., °C

136–137²

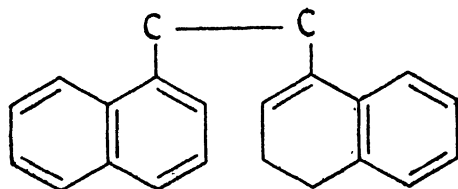
(a) The structure of this compound was not clearly defined in the literature.

 $C_{22}H_{20}$ **1-Benzhydrylindane**

M. P., °C

85–86¹⁸**1-(1'-Naphthyl)-2-[3''-(2''-methylindenyl)]-ethane**

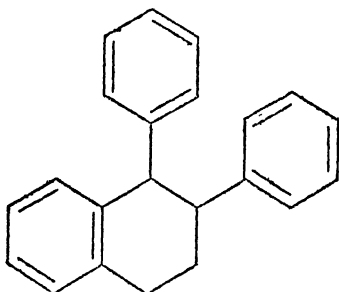
M. P., °C

99–99.5⁴**1-(1'-Naphthyl)-2-[1''-(3'',4''-dihydronaphthyl)]-ethane**

B. P., °C @ 760mm
225-227

1³⁹

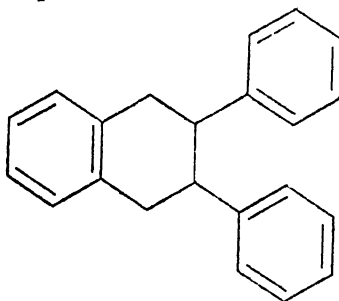
**1,2-Diphenyl-1,2,3,4-tetrahydro-
naphthalene**



B. P., °C @ 760mm
183-184

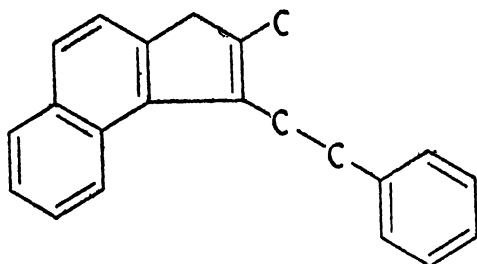
1.5¹⁰

**2,3-Diphenyl-1,2,3,4-tetrahydro-
naphthalene**



M. P., °C
129-129.5¹⁹

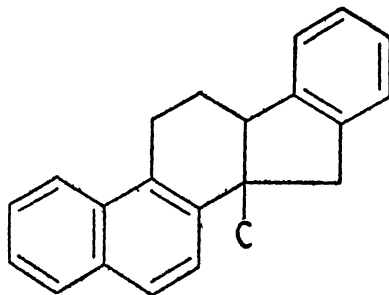
**2-Methyl-3-phenethyl-4,5-benzoin-
dene**



B. P., °C @ 760mm
190-195

0.4¹⁵

**1-Methyl-1,2-(2',3'-indano)-1,2,3,4-
tetrahydrophenanthrene**



M. P., °C
111-112⁴

B. P., °C @ 760mm
190-195

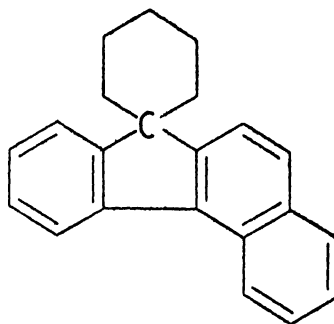
0.2⁴

**Cyclopentano-[hi]-2,3-dimethyl-x,x-
dihydrochrysene (a)**

M. P., °C
193.5-194.5²⁷

(a) The structure of this compound
was not clearly defined in the
literature.

**Spiro[3,4-benzofluorene-9,1'-
cyclohexane]**

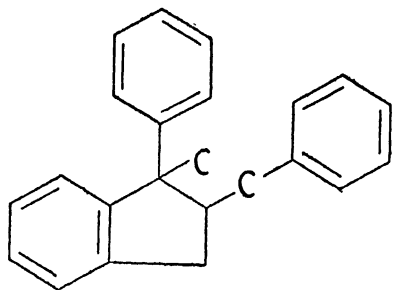


B. P., °C @ 760mm
225-230

0.05⁹

$C_{23}H_{22}$

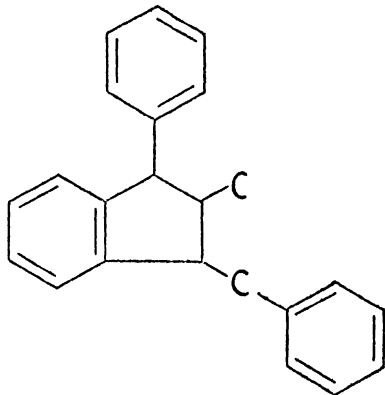
1-Methyl-1-phenyl-2-benzylindane



M. P., °C

117–118.5¹¹

1-Phenyl-2-methyl-3-benzylindane

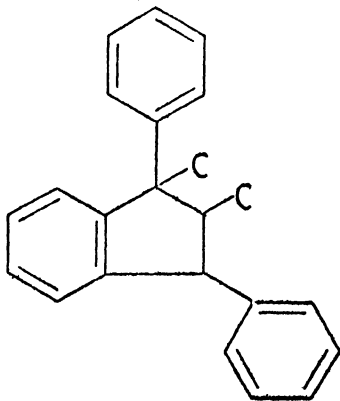


B. P., °C @ 760mm

212–215

16⁸

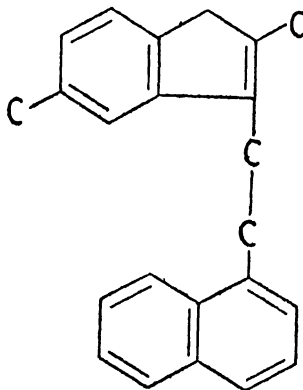
1,2-Dimethyl-1,3-diphenylindane



M. P., °C

97.5–98.5¹¹

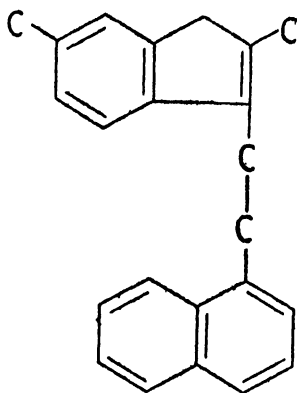
1-(1'-Naphthyl)-2-[3''-(2'',5''-dimethylindenyl)]-ethane



M. P., °C

81–81.5⁴

1-(1'-Naphthyl)-2-[3''-(2'',6''-dimethylindenyl)]-ethane

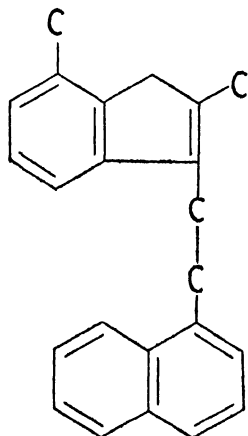


B. P., °C @ 760mm

184–186

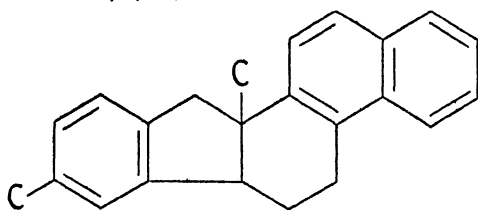
0.05⁴

1-(1'-Naphthyl)-2-[3''-(2'',7''-dimethylindenyl)]-ethane



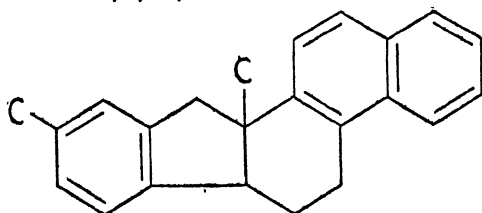
M. P., °C
96⁴

1,2-(2',1'-Naphtho)-6,9a-dimethyl-3,4,4a,9a-tetrahydrofluorene



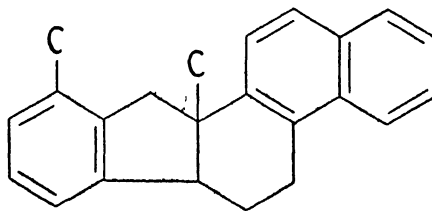
M. P., °C
106.5-107⁴

1,2-(2',1'-Naphtho)-7,9a-dimethyl-3,4,4a,9a-tetrahydrofluorene



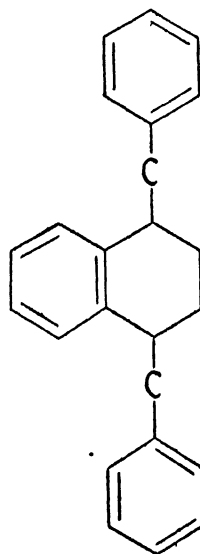
M. P., °C
134.5-135⁴

1,2-(2',1'-Naphtho)-8,9a-dimethyl-3,4,4a,9a-tetrahydrofluorene



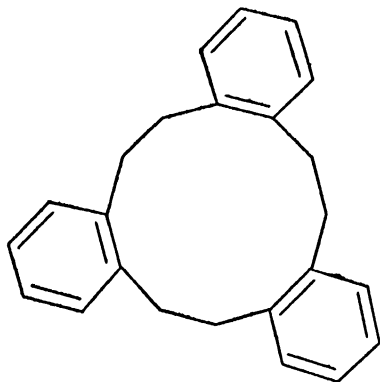
M. P., °C
121-122⁴

1,4-Dibenzyl-1,2,3,4-tetrahydronaphthalene



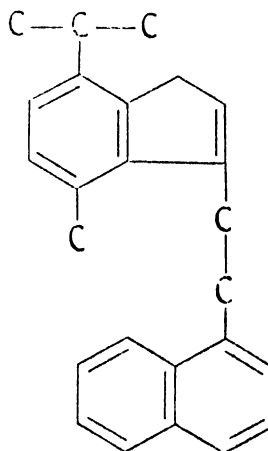
M. P., °C
92-93²¹

1,2,5,6,9,10-Tribenzocyclododecane



M. P., °C
184.5⁷

1-(1'-Naphthyl)-2-[3''-(4''-methyl-7''-isopropylindenyl)]-ethane

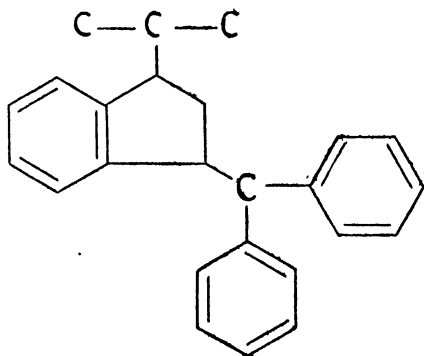


M. P., °C
92-93¹⁷

This series continued on next page

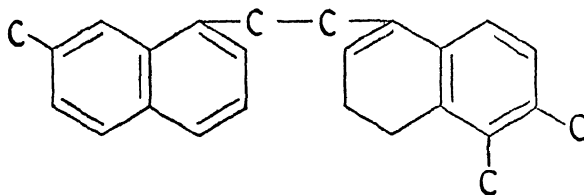
$C_{26}H_{26}$

1-Isopropyl-3-benzhydrylindane



M. P., °C
126.5-127.5⁵³

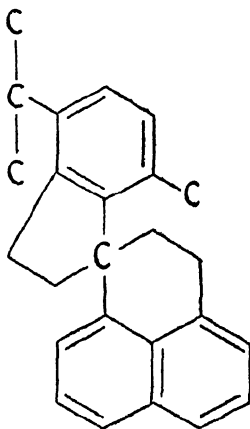
1-[1'-(7'-Methylnaphthyl)]-2-[1''-(5'',6''-dimethyl-3'',4''-dihydronaphthyl)]-ethane



B. P., °C @ 760mm
215-217

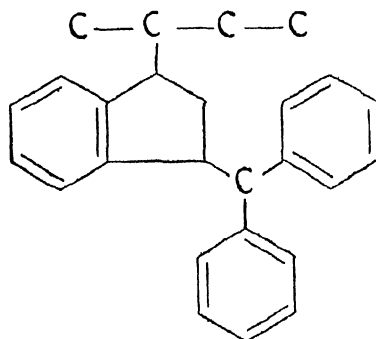
0.3⁴⁰

Spiro[4-isopropyl-7-methylindane-1, 1'-phenalan] (a)



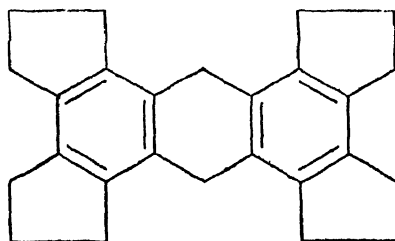
M. P., °C
82-83¹⁷

(a) The above formula was given for this compound, but the name given in the literature was "7-methyl-4-isopropylhydrindene-1,7'-spiro-7',8'-dihydrophenalene."



M. P., °C
104-106⁵³

1,2,3,4,5,6,7,8-Tetracyclopentano-9,10-dihydroanthracene

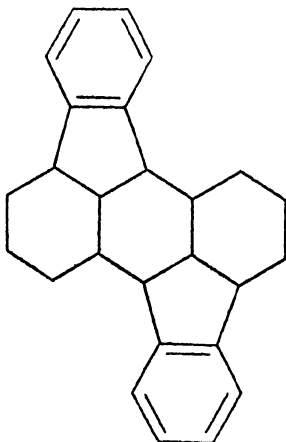


M. P., °C
377-378⁴

C₂₅H₂₈

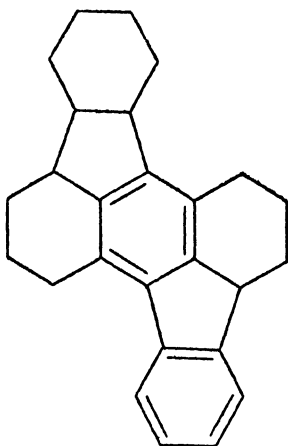
1-sec-Butyl-3-benzhydrylindane

**Diindano-[3',2',1'-de,3'',2'',1''-kl]-
tetradecahydroanthracene**



M. P., °C
246-248⁴⁹

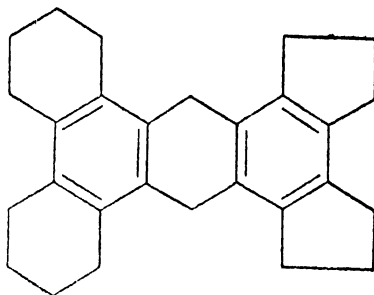
**Indo-[1',2',3'-de]-(3a'',4'',5'',6'',
7'',7a''-hexahydroindo)-[1'',2'',
3''-kl]-1,2,3,4,5,6,7,8-octahy-
droanthracene**



M. P., °C
271-273⁴⁹

$C_{28}H_{32}$

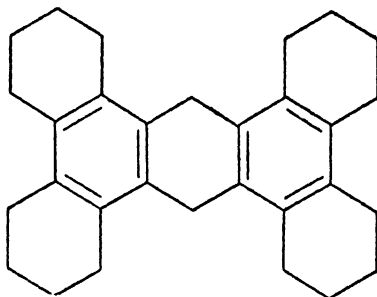
**1,2,3,4-Dicyclopentano-5,6,7,8-di-
cyclohexano-9,10-dihydroanthra-
cene**



M. P., °C
333-334⁵

$C_{30}H_{38}$

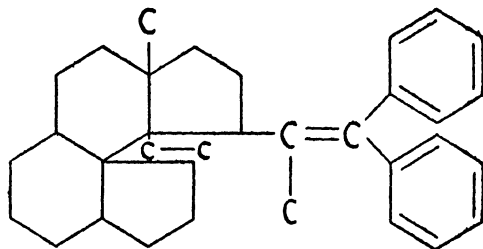
**1,2,3,4,5,6,7,8-Tetracyclohexano-
9,10-dihydroanthracene**



M. P., °C
382-383⁶

$C_{34}H_{44}$

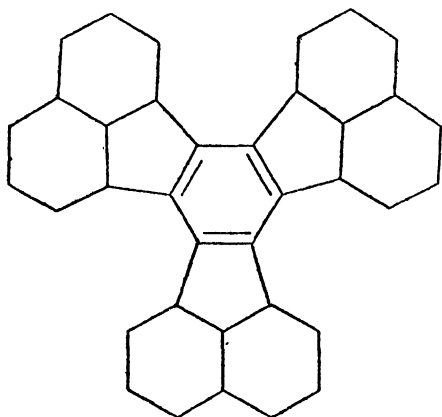
**1,1-Diphenyl-2-[3'-(hexahydroindano-
[e-7'',7a'']-3a'-ethyl-7a'-methyl-
hexahydroindanyl)]-propene-1**



M. P., °C
178¹²



1,2,3,4,5,6-Tri-[2',1'-(2a',3',4',5',
5a',6',7',8',8a',8b'-decahydro-
acenaphtho)]-benzene



M. P., °C

217-219⁵¹

215⁴⁹

B. P., °C @ 760mm

360

0.2¹⁷

(a) The structures given cholestane and derivatives vary. The above name and structure appear in reference 48.

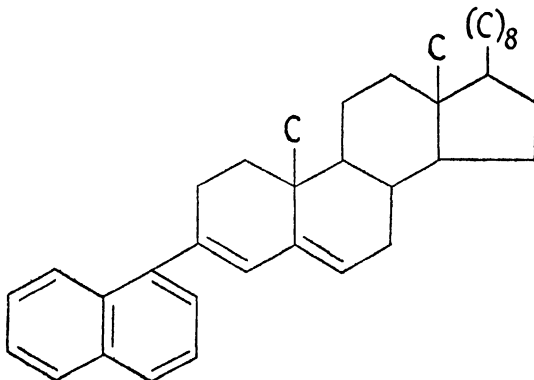
*References on Miscellaneous Polynuclear
Aromatics of Empirical Formula*

C_nH_{2n-24}

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3- α -Naphthylcholestadiene (a)



M. P., °C

131-133⁴⁸

Additional Data

$[\alpha]_D^{20} = -49.7^\circ$ ⁴⁸

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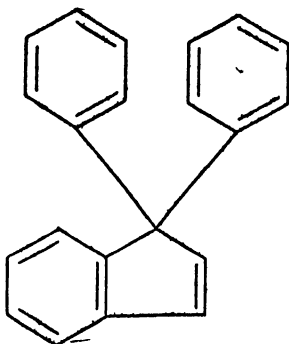
X. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-26}

1. Indene with Two Phenyl Substitutions
2. Binaphthyls, Their Alkyl Derivatives, and Two Naphthyl Substitutions on Alkanes
3. Anthracene and Phenanthrene with One Phenyl Substitution
4. Cholanthrene and Its Alkyl Derivatives
5. Other Benzocyclanoanthracenes, Benzocyclanophenanthrenes, and Their Alkyl Derivatives
6. Miscellaneous Polynuclear Aromatics of Empirical Formula C_nH_{2n-26}

1. INDENE WITH TWO PHENYL SUBSTITUTIONS, $C_{21}H_{16}$

$C_{21}H_{16}$

1,1-Diphenylindene

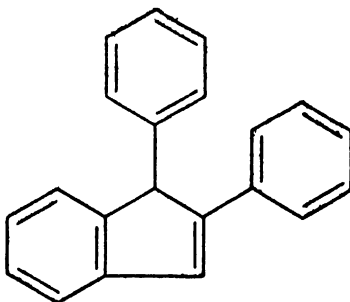


M. P., °C

91-92¹³

90-91¹⁴

1,2-Diphenylindene



M. P., °C

177

177-178^{19, 20, 21}

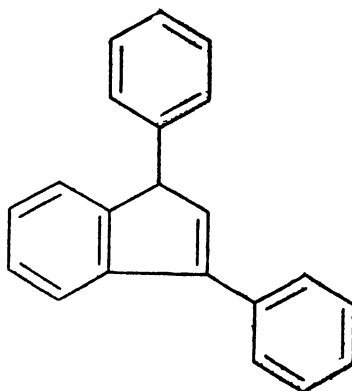
177²⁵

176-177^{23, 24}

175³

174-175¹

1,3-Diphenylindene



M. P., °C

84-85 (a)¹²

71-72³¹

68-69 (a)¹²

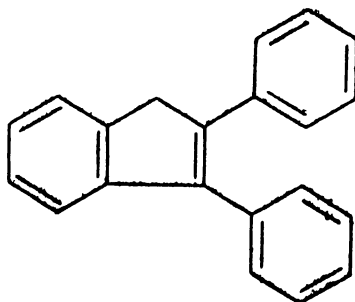
B. P., °C @ 760mm

230

15³¹

(a) These constants were determined on different crystalline forms.

2,3-Diphenylindene

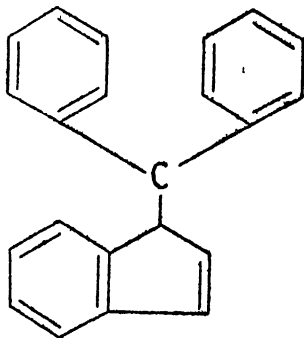


M. P., °C

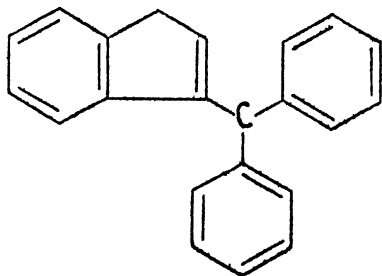
109.5

111⁷

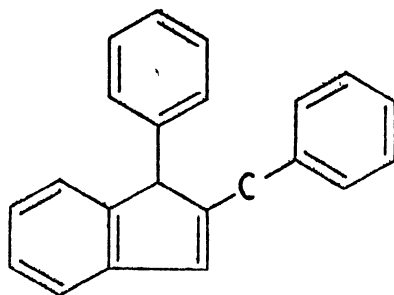
110³

109–110²¹108–109^{20, 29}108²⁵107–108^{23, 24}C₂₂H₁₈**1-Benzhydrylindene**

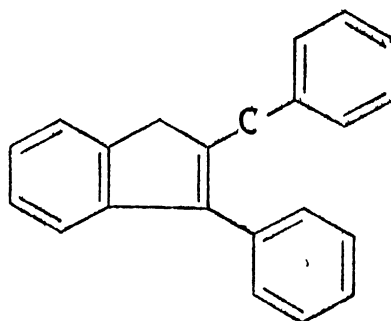
M. P., °C

163–164⁶161¹¹160–161¹⁰**3-Benzhydrylindene**

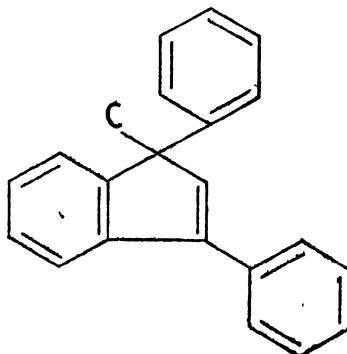
M. P., °C

115–116^{10, 11}114²⁶113–114^{6, 28}**1-Phenyl-2-benzylindene**

M. P., °C

101²⁴97–99⁶**2-Benzyl-3-phenylindene**

M. P., °C

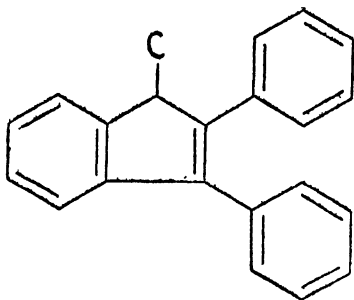
101⁵96–98^{4, 8}96–97.5⁸92–93²²**1-Methyl-1,3-diphenylindene**

M. P., °C

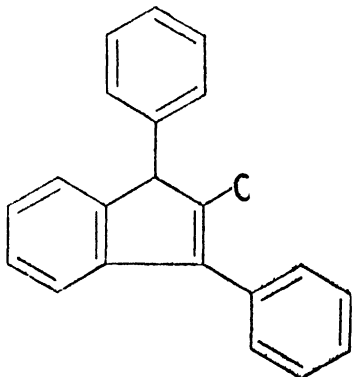
59–60^{16, 17}

B. P., °C @ 760mm

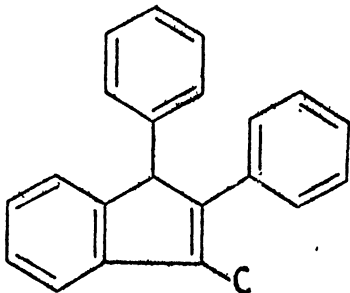
205–210

7¹⁷**1-Methyl-2,3-diphenylindene**

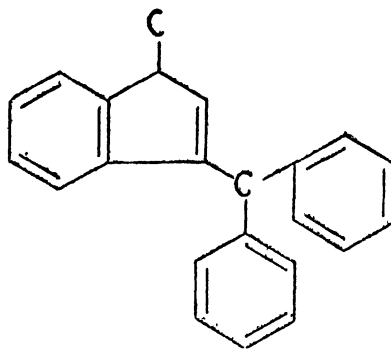
M. P., °C

106.5¹⁷**1,3-Diphenyl-2-methylindene**

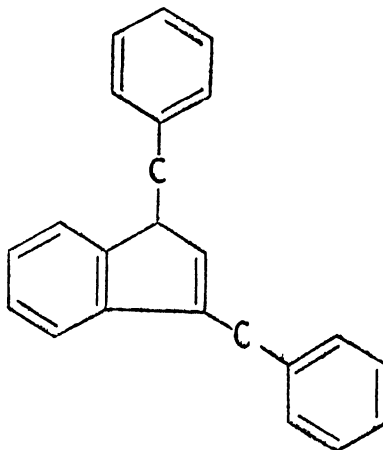
M. P., °C

108¹⁵**1,2-Diphenyl-3-methylindene**

M. P., °C

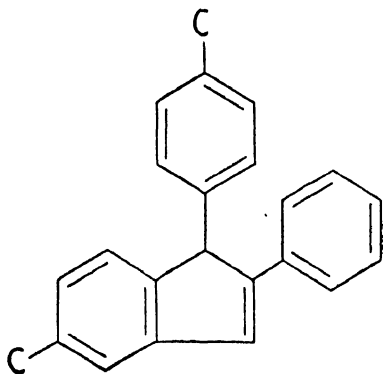
91¹⁷ $C_{23}H_{20}$ **1-Methyl-3-benzhydrylindene**

M. P., °C

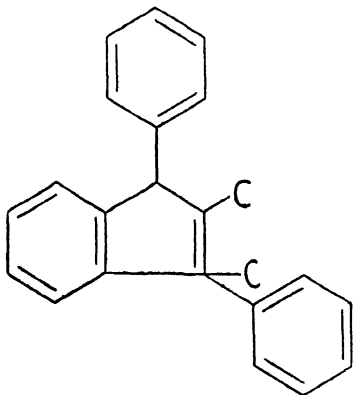
162.5–163.5³⁰**1,3-Dibenzylindene**

M. P., °C

62–63²⁷

1-*p*-Tolyl-2-phenyl-5-methylindene

M. P., °C

145–146¹⁸**1,3-Diphenyl-2,3-dimethylindene**

M. P., °C

68.5–69.5°

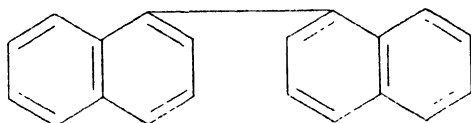
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2. BINAPHTHYLS, THEIR ALKYL DERIVATIVES, AND TWO NAPHTHYL SUBSTITUTIONS ON ALKANES, C_nH_{2n-26}

$C_{20}H_{14}$

1,1'-Binaphthyl



M. P., °C

155.5

160.5^{22, 46}

157-158¹⁸

156^{25, 37}

155^{5, 27, 38}

151-155³⁶

154 (a)

153-154²⁴

153⁹

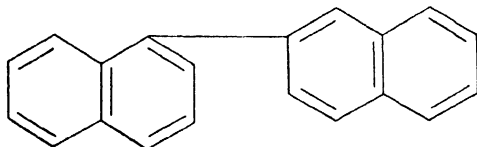
B. P., °C @ 760mm

240-244

12³⁷

(a) The melting point 154 is found in references 2, 6, 16, 17, 20, 21, 26, 30, 32, 35, 41.

1,2'-Binaphthyl



M. P., °C

76

79-80^{22, 42}

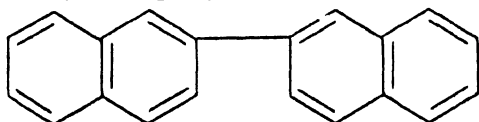
76³⁶

75-76⁴⁴

75^{33, 34, 35}

74.5-75.0^{14A}

2,2'-Binaphthyl



M. P., °C

187

190^{d, 28}

187-189¹²

188⁴³

187-188⁴

187.8⁷

187.5²²

187 (a)

186^{23, 47}

184²⁵

182-184³¹

181-182.5²⁹

182^{14, 15}

B. P., °C @ 760mm

452⁷

(a) The melting point 187 is found in references 1, 8, 10, 11, 13, 17, 19, 33, 34, 35, 36, 39, 40, 45.

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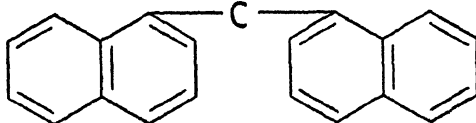
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Di-1,1'-naphthylmethane



M. P., °C

108

109¹, 5, 6, 7, 15

108-109¹⁹

106-107²⁰

B. P., °C @ 760mm

245-250

4¹

*D*₄²⁰

1.0224

52° ¹⁹

*n*_D²⁰

1.686

52° ¹⁹

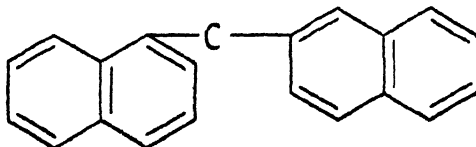
1.677

***n*_{Hα} ^{52 19}**

1.712

***n*_{Hβ} ^{52 19}**

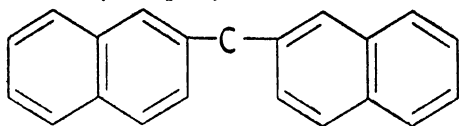
Di-1,2'-naphthylmethane



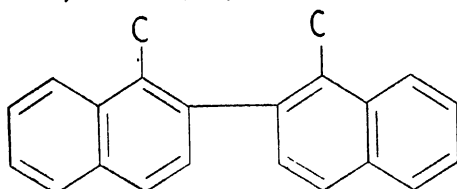
M. P., °C

96²³

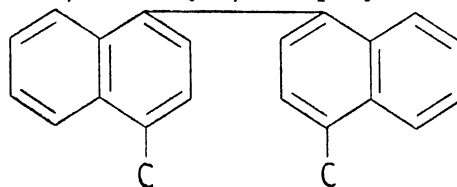
95-96¹

Di-2,2'-naphthylmethane

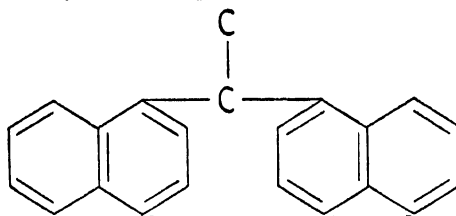
M. P., °C
 93^{5, 8}
 92²⁴

 $C_{22}H_{18}$ **1,1'-Dimethyl-2,2'-binaphthyl**

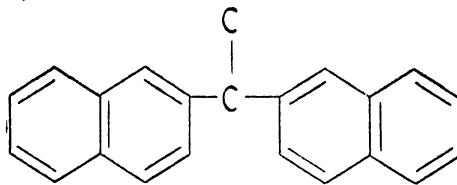
M. P., °C
 230²⁹
 227^{10, 21}

4,4'-Dimethyl-1,1'-binaphthyl

M. P., °C
 147¹⁰

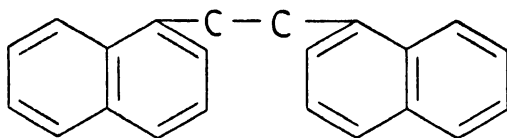
1,1-Di-(1'-naphthyl)-ethane

M. P., °C
 136⁹

1,1-Di-(2'-naphthyl)-ethane

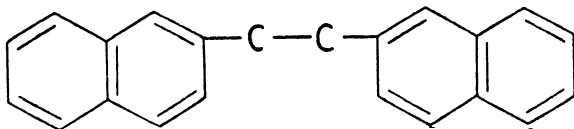
M. P., °C
 182¹²

This series continued on next page

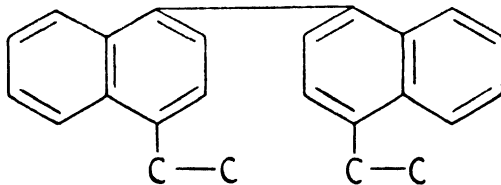
1,2-Di-(1'-naphthyl)-ethane

M. P., °C

161

162-163³⁰161-162²²161-161.5³¹160^{3, 27, 33}159-160¹¹**1,2-Di-(2'-naphthyl)-ethane**

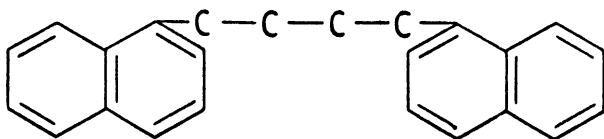
M. P., °C

182-183³⁰182²²181-182³²**4,4'-Diethyl-1,1'-binaphthyl (a)**

M. P., °C

76-77¹⁸

- (a) The structure of this compound was not clearly defined in the literature.

1,4-Di-(1'-naphthyl)-butane

M. P., °C.

102¹⁶101²

B. P., °C @ 760mm

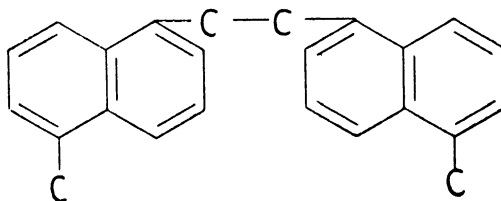
240

3¹⁶**x,x-Di-[1'-(2'-methylnaphthyl)]-ethane (a)**

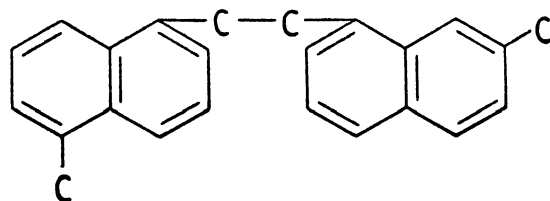
M. P., °C

177-178¹⁷

(a) The structure of this compound was not clearly defined in the literature.

1,2-Di-[1'-(5'-methylnaphthyl)]-ethane

M. P., °C

115-117²⁶**1-[1'-(5'-Methylnaphthyl)]-2-[1''-7''-methylnaphthyl]-ethane**

M. P., °C

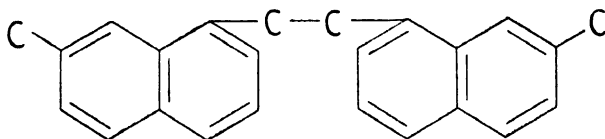
74-75²⁵

B. P., °C @ 760mm

192-193

0.1²⁵

1,2-Di-[1'-(7'-methylnaphthyl)]-ethane



M. P., °C

122.5-123.5²⁸

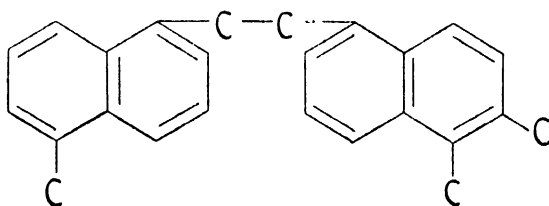
B. P., °C @ 760mm

220-225

0.3²⁸

C₂₅H₂₄

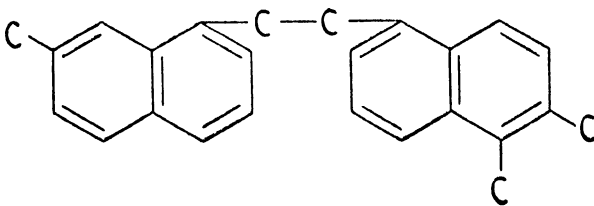
1-[1'-(5'-Methylnaphthyl)]-2-[1''-(5'',6''-dimethylnaphthyl)]-ethane



M. P., °C

128-129²⁸

1-[1'-(7'-Methylnaphthyl)]-2-[1''-(5'',6''-dimethylnaphthyl)]-ethane



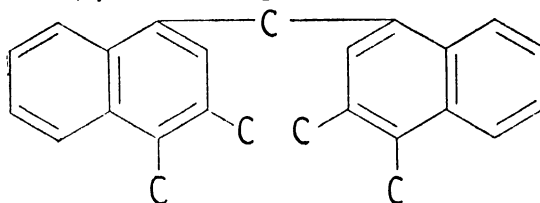
M. P., °C

108.5-109.5²⁸

B. P., °C @ 760mm

225-230

0.2²⁸

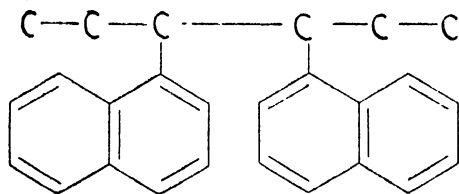
Di-1-(3,4-dimethylnaphthyl)-methane

M. P., °C
174–175¹⁷

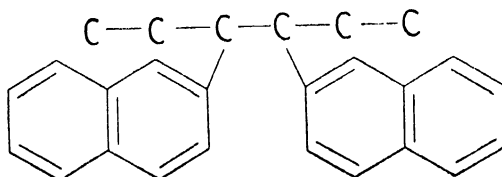
 $C_{26}H_{26}$ **x₆-Hexamethyl-x, x'-binaphthyl (a)**

M. P., °C
183¹⁸

(a) The structure of this compound was not clearly defined in the literature.

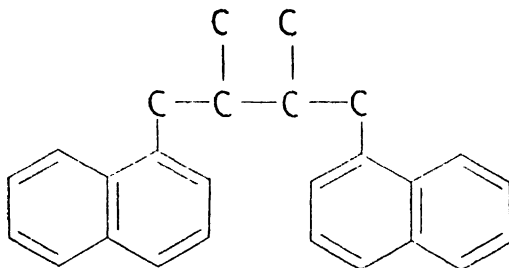
3,4-Di-(1'-naphthyl)-hexane

M. P., °C
155⁴

3,4-Di-(2'-naphthyl)-hexane

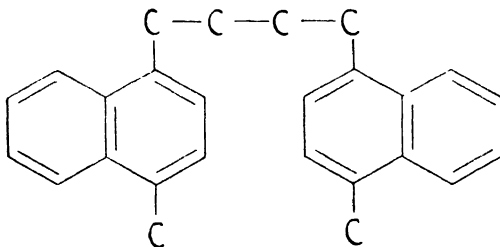
M. P., °C
198⁴

**1,4-Di-(1'-naphthyl)-2,3-dimethyl-
butane**



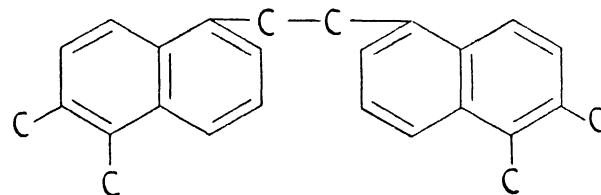
M. P., °C
131-132²

**1,4-Di-[1'-(4'-methylnaphthyl)]-
butane**



M. P., °C
126-127¹⁴

**1,2-Di-[1'-(5',6'-dimethylnaphthyl)]-
ethane**



M. P., °C
163-165²⁶

*References on Alkyl Binaphthyls and Two
Naphthyl Substitutions on Alkanes*

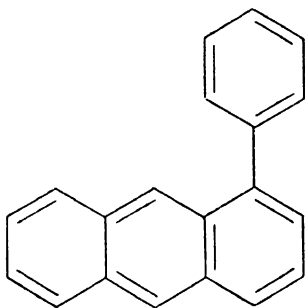
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3. ANTHRACENE AND PHENANTHRENE WITH ONE PHENYL SUBSTITUTION, $C_{20}H_{14}$



1-Phenylanthracene

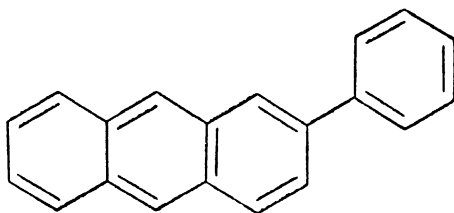


M. P., °C

123⁴⁴

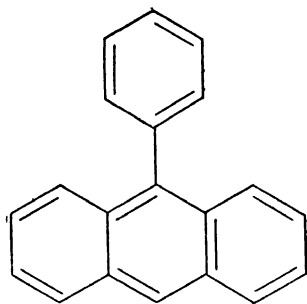
110–112^{20, 22}

2-Phenylanthracene



M. P., °C

207–207.5²²

9-Phenylanthracene

M. P., °C

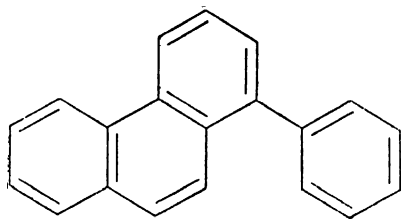
154.5

155–157⁴156^{27, 36, 41}155²⁶152–153^{40, 42}152.8³⁵**x-Phenylanthracene (a)**

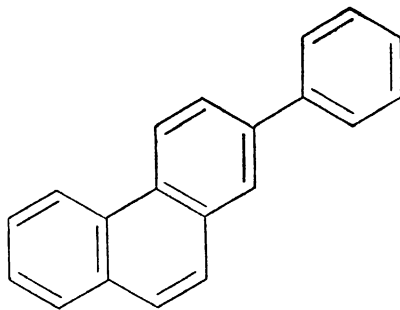
B. P., °C @ 760mm

417²⁹

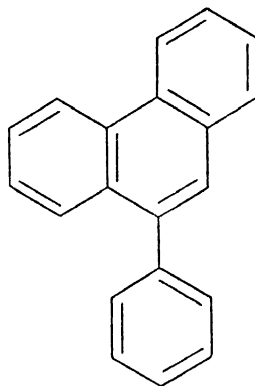
(a) The structure of this compound was not clearly defined in the literature.

1-Phenylphenanthrene

M. P., °C

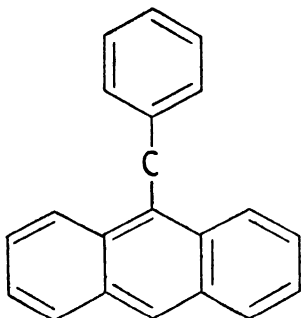
79–79.5³**2-Phenylphenanthrene**

M. P., °C

196.6–197.2³⁷**9-Phenylphenanthrene**

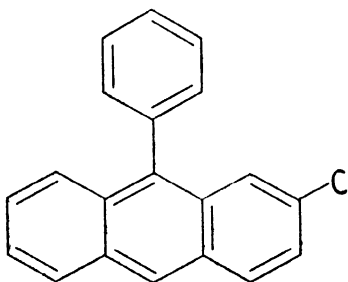
M. P., °C

113⁴³110¹³105–106^{28, 32}104–105¹⁸C₂₁H₁₄**9-Benzylanthracene**



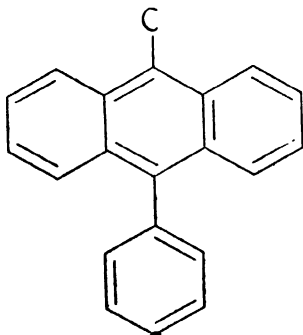
M. P., °C
133^{14, 21}

2-Methyl-9-phenylanthracene



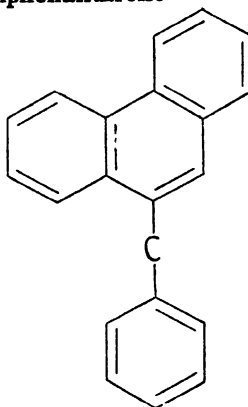
M. P., °C
119^{31, 39}

9-Methyl-10-phenylanthracene



M. P., °C
116³⁸
113.5–114.5¹⁸
112.5–113.5¹⁹
113¹²
112¹¹

9-Benzylphenanthrene



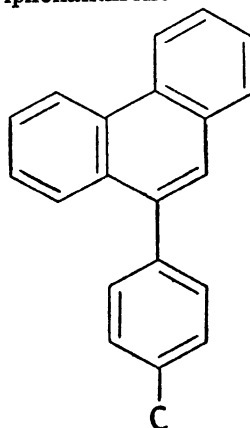
M. P., °C
155–156³⁰
154²⁴
153–154^{1, 2}

x-Benzylphenanthrene (a)

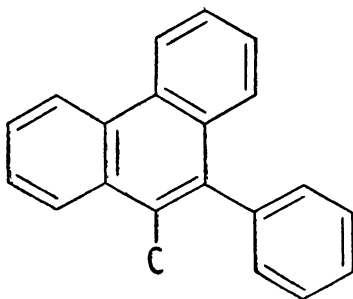
M. P., °C
107–108²
105–106²
95–96²
91–92⁴⁶
79–80²

(a) The structures of these compounds were not clearly defined in the literature.

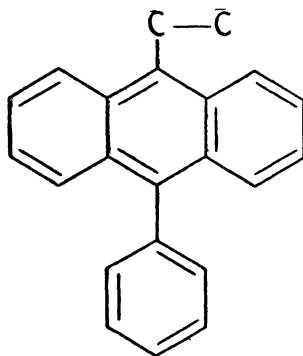
9-p-Tolylphenanthrene



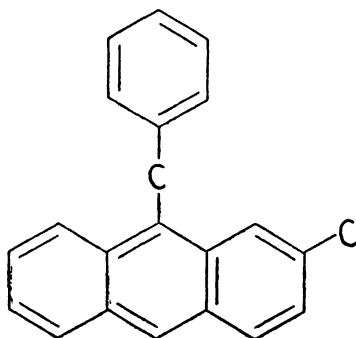
M. P., °C
90–91¹⁸

9-Methyl-10-phenylphenanthrene

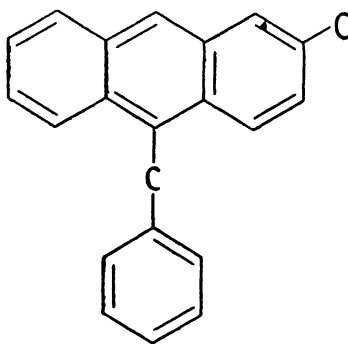
M. P., °C
99–100¹⁷

C₂₂H₁₈**9-Ethyl-10-phenylanthracene**

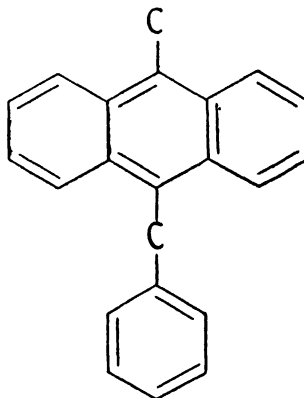
M. P., °C
110⁵
107–108.5¹⁹

2-Methyl-9-benzylanthracene

M. P., °C
139⁶

2-Methyl-10-benzylanthracene

M. P., °C
101⁶

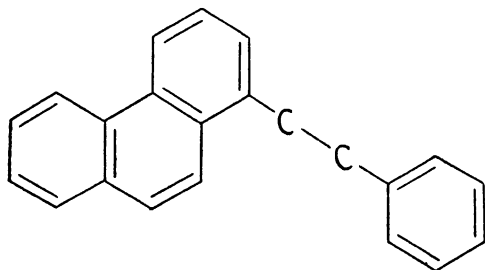
9-Methyl-10-benzylanthracene

M. P., °C
167.8–168.6¹⁵

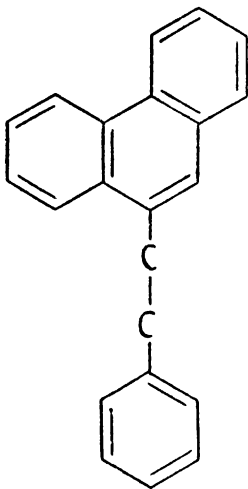
x-Methyl-9-tolylanthracene (a)

M. P., °C
191³⁴

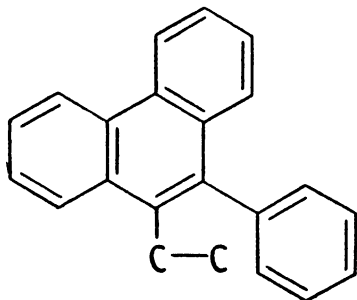
(a) The structure of this compound was not clearly defined in the literature.

1-Phenethylphenanthrene

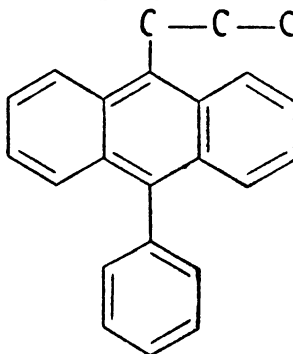
M. P., °C
86.5–89.5²⁵

9-Phenethylphenanthrene

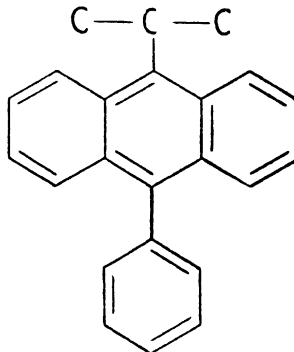
M. P., °C
81.5¹³

9-Ethyl-10-phenylphenanthrene

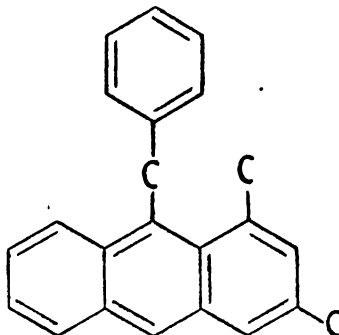
M. P., °C
161¹⁷

 $C_{23}H_{20}$ **9-*n*-Propyl-10-phenylanthracene**

M. P., °C
115–116⁵

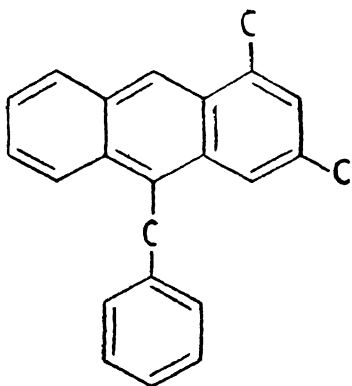
9-Isopropyl-10-phenylanthracene

M. P., °C
166–167⁵

1,3-Dimethyl-9-benzylantracene

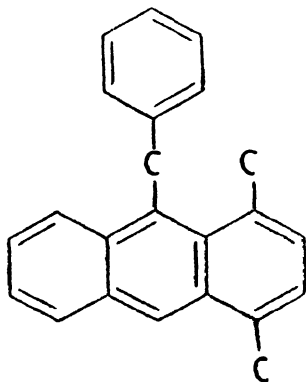
M. P., °C
126⁸

1,3-Dimethyl-10-benzylantracene



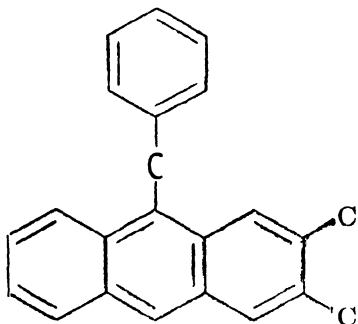
M. P., °C
149⁸

1,4-Dimethyl-9-benzylantracene



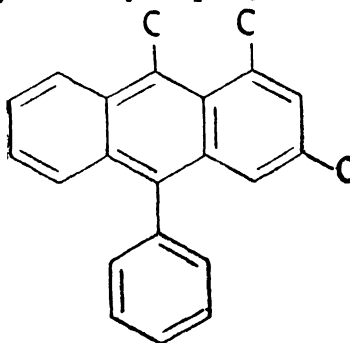
M. P., °C
135⁹

2,3-Dimethyl-9-benzylantracene



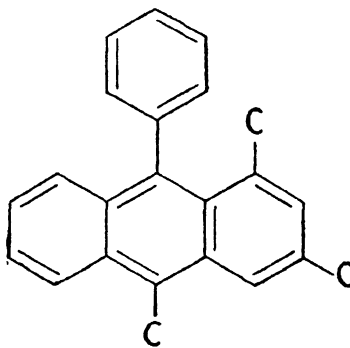
M. P., °C
149¹⁰

1,3,9-Trimethyl-10-phenylantracene



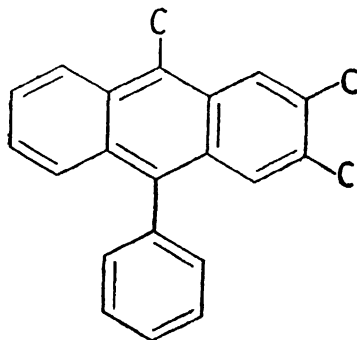
M. P., °C
165⁸

1,3,10-Trimethyl-9-phenylantracene

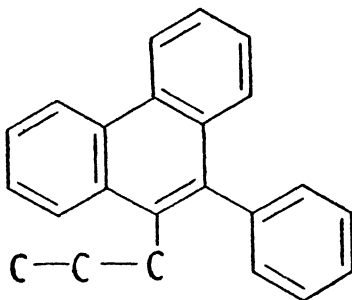


M. P., °C
121⁸

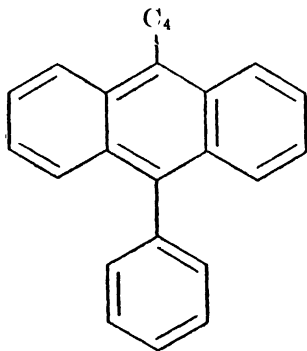
2,3,9-Trimethyl-10-phenylantracene



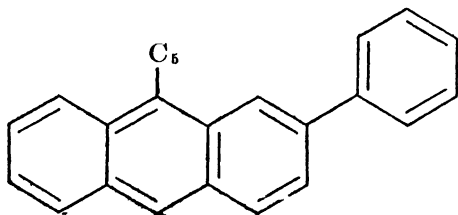
M. P., °C
119¹⁰

9-*n*-Propyl-10-phenylphenanthrene

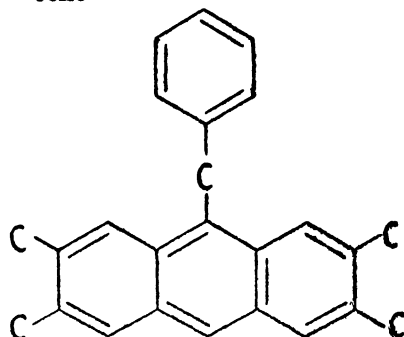
M. P., °C
148.5–149.5¹⁶

 $C_{24}H_{22}$ **9-Butyl-10-phenylanthracene**

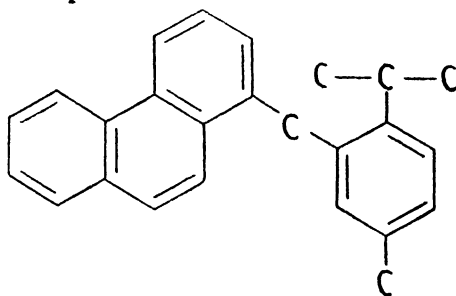
M. P., °C
156⁵

 $C_{25}H_{24}$ **2-Phenyl-9-pentylanthracene**

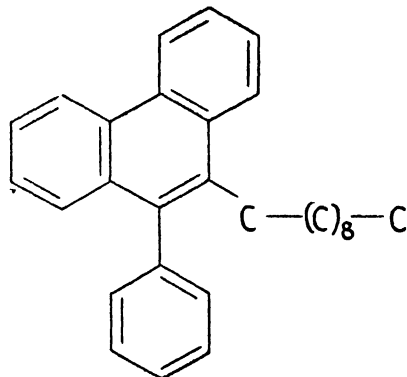
M. P., °C
203–204⁵

2,3,6,7-Tetramethyl-9-benzylanthracene

M. P., °C
235⁷

1-(2'-Isopropyl-5'-methylbenzyl)-phenanthrene

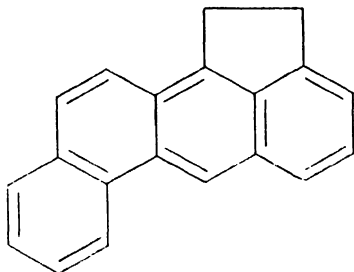
M. P., °C
115–116²³

 $C_{30}H_{34}$ **9-Phenyl-10-*n*-decylphenanthrene**

M. P., °C
99–100¹⁶

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4. CHOLANTHRENE AND ITS ALKYL DERIVATIVES, C_nH_{2n-26} **Cholanthrene**

M. P., °C
172

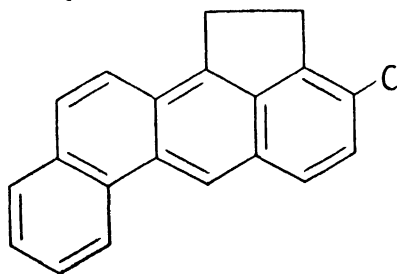
173.0–173.5²⁵

173–173.5²⁰

170–171¹¹

170.1–170.6¹²

168.5–170^{2, 10}

**3-Methylcholanthrene**

M. P., °C
178.9

180.3–180.6¹

179.5–180¹⁵

178.5–179.5²¹

178.5–179^{16, 18, 25}

178–179²⁴

177–178¹⁶

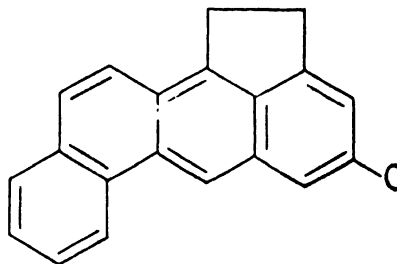
176.5–177.5⁹

175.3–177.1¹²

176–177¹⁷

175–177⁴

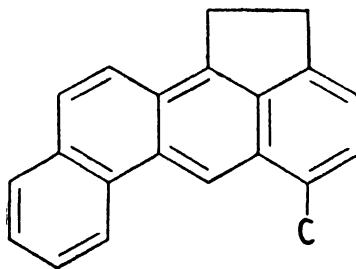
175.5¹⁴

4-Methylcholanthrene

M. P., °C

154.5–155³

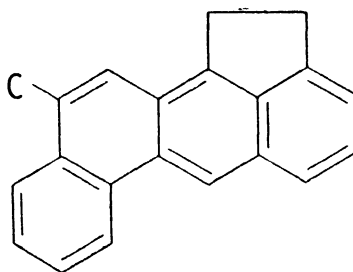
153–154¹³

5-Methylcholanthrene

M. P., °C

160–161.5 (a)³

(a) This compound remelts at 164–165.

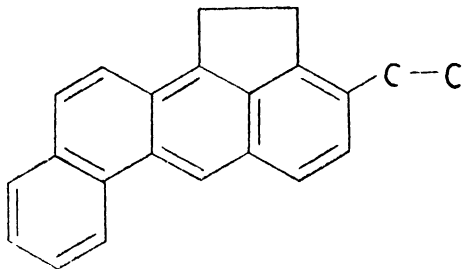
11-Methylcholanthrene

M. P., °C

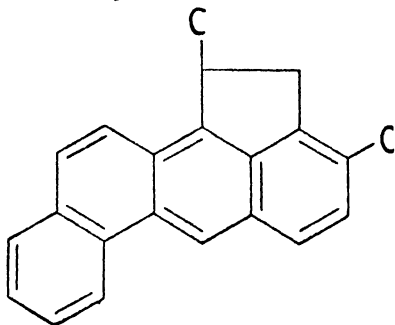
204.2–205.2¹³

x-Methylcholanthrene (a)*D*₄²⁰1.277²³

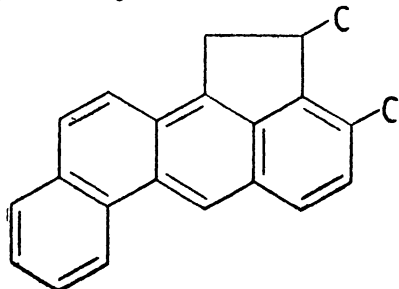
(a) The structure of this compound was not clearly defined in the literature.

C₂₂H₁₈**3-Ethylcholanthrene**

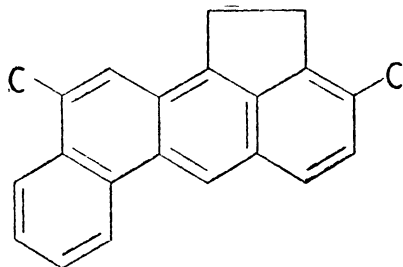
M. P., °C

179.5–180^{5, 7}**1,3-Dimethylcholanthrene**

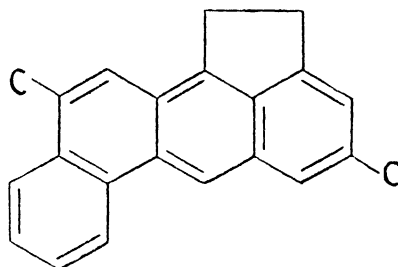
M. P., °C

179–180⁶**2,3-Dimethylcholanthrene**

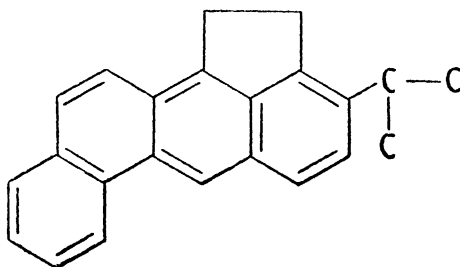
M. P., °C

169–170^{19, 26}**3,11-Dimethylcholanthrene**

M. P., °C

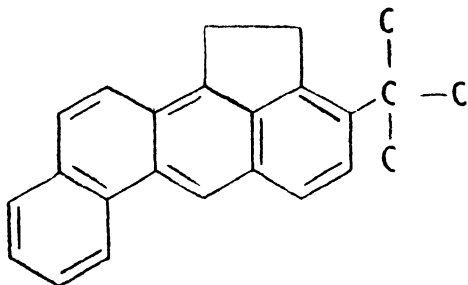
175.8–176.5¹³**4,11-Dimethylcholanthrene**

M. P., °C

161.7–162.4¹³C₂₃H₂₀**3-Isopropylcholanthrene**

M. P., °C

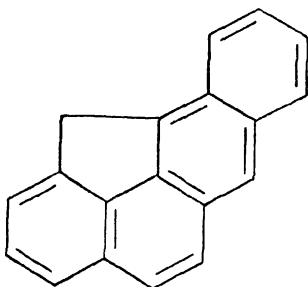
188–189⁸

**3-*tert*-Butylcholanthrene**

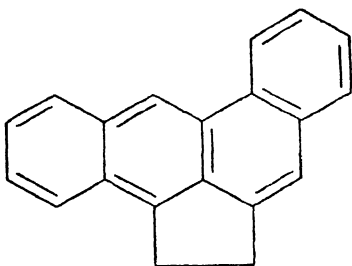
M. P., °C
204–205²²

*References on Cholanthrene and Its Alkyl
Derivatives*

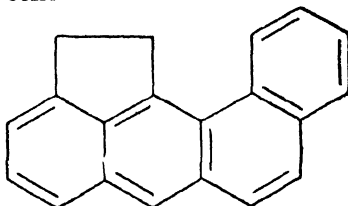
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5. OTHER BENZOCYCLANOANTHRACENES, BENZOCYCLANOPHENANTHRENES, AND THEIR ALKYL DERIVATIVES, C_nH_{2n-26} $C_{19}H_{12}$ **Benzo-[b]-cyclopentano-[def]-phenanthrene**

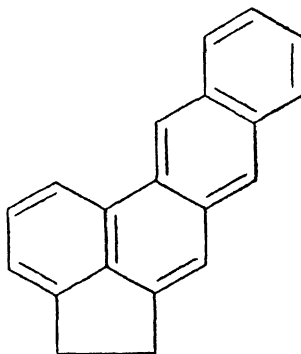
M. P., °C

122.7-123.1⁶122.5-123⁷120-121⁸ $C_{20}H_{14}$ **Benzo-[a]-cyclopentano-[de]-anthracene**

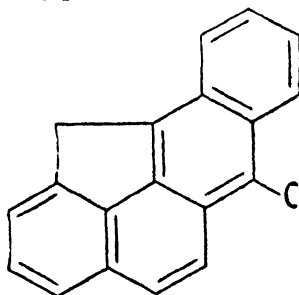
M. P., °C

138.5-140¹²137-138¹⁸133-134¹⁷130⁴**Benzo-[a]-cyclopentano-[kl]-anthracene**

M. P., °C

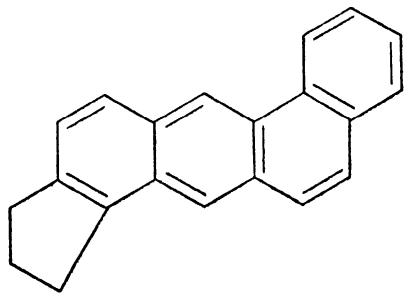
176.5-177^{10, 18}**Benzo-[b]-cyclopentano-[jk]-phenanthrene**

M. P., °C

233.1-234.3⁵192.5-193.5¹³192¹**Benzo-[b]-cyclopentano-[def]-1-methylphenanthrene**

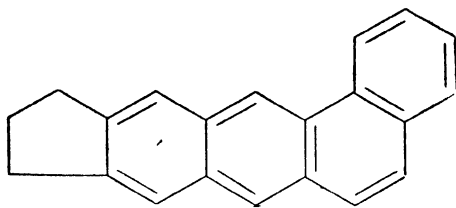
M. P., °C

181-181.4⁷

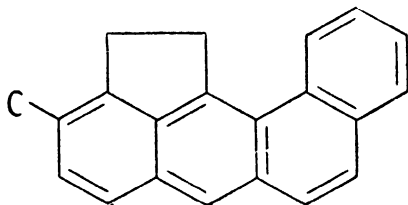
$C_{21}H_{16}$ **1,2-Benzo-5,6-cyclopentanoanthracene**

M. P., °C
199–200^{2, 3}

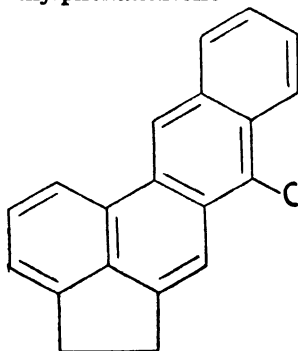
D_4^{20} 1.255 18°¹⁴

1,2-Benzo-6,7-cyclopentanoanthracene

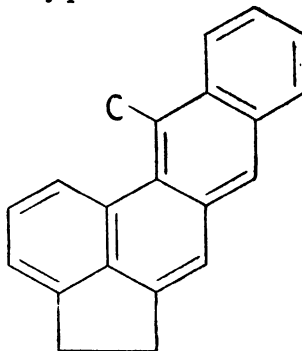
M. P., °C
164–165³

Benzo-[a]-cyclopentano-[kl]-7-methylanthracene

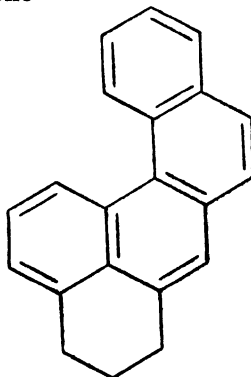
M. P., °C
187.5^{9, 18}

Benzo-[b]-cyclopentano-[jk]-1-methylphenanthrene

M. P., °C
181.7–182.5¹⁶

Benzo-[b]-cyclopentano-[jk]-4-methylphenanthrene

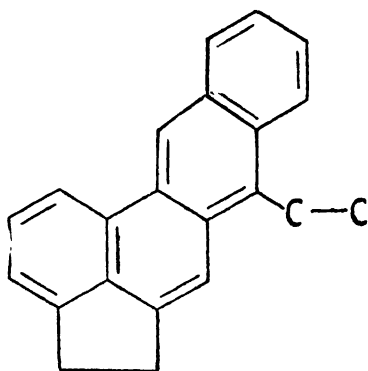
M. P., °C
133–134¹⁵

Benzo-[c]-cyclohexano-[jk]-phenanthrene

M. P., °C
138–138.5¹¹

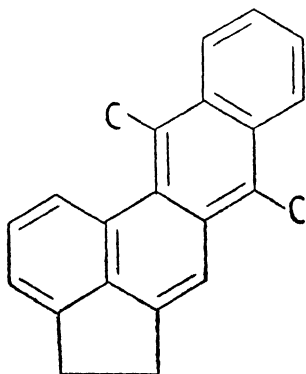
 $C_{22}H_{18}$

Benzo-[b]-cyclopentano-[jk]-1-ethyl-
phenanthrene



M. P., °C
174.5–175¹⁶

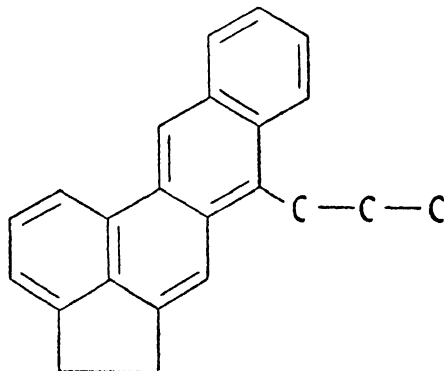
Benzo-[b]-cyclopentano-[jk]-1,4-
dimethylphenanthrene



M. P., °C
164–164.5¹⁶

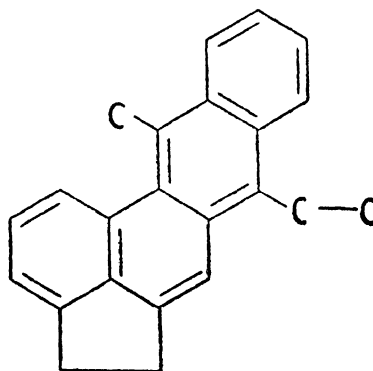
 $C_{23}H_{20}$

Benzo-[b]-cyclopentano-[jk]-1-*n*-
propylphenanthrene

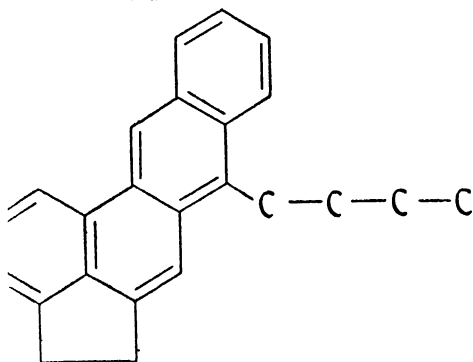


M. P., °C
165.5–166.5¹⁶

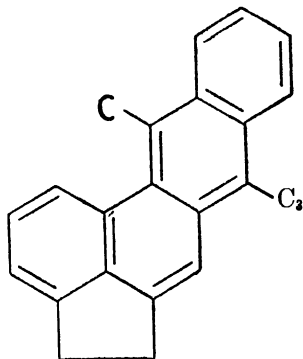
Benzo-[b]-cyclopentano-[jk]-1-ethyl-
4-methylphenanthrene



M. P., °C
157.5–158.5¹⁶

**Benzo-[b]-cyclopentano-[jk]-1-*n*-butylphenanthrene**

M. P., °C
128–129¹⁶

Benzo-[b]-cyclopentano-[jk]-1-propyl-4-methylphenanthrene

M. P., °C
119.5–120.5¹⁵

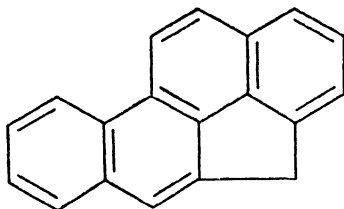
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6. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-26}



Cyclopentano-[def]-chrysene



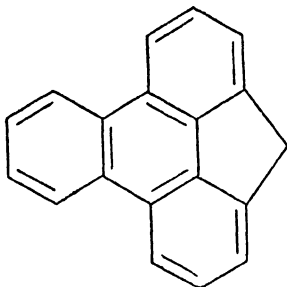
M. P., °C

172.4–172.9²²

172–172.5²²

171.5–172.3²²

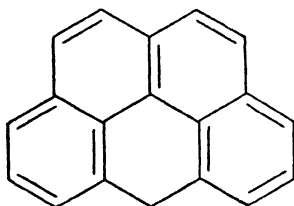
Cyclopentano-[def]-triphenylene



M. P., °C

115–116³⁷

Benzo-[cd]-5-hydropyrene

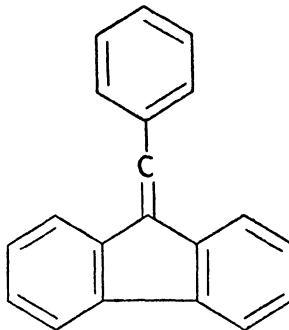


M. P., °C

135⁴⁹



9-Benzylidene fluorene



M. P., °C

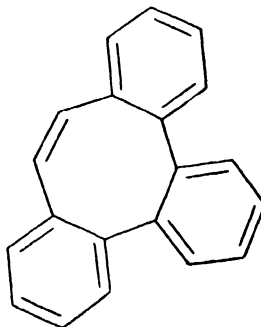
153–154 (a)⁴²

76 (b)

(a) This constant was determined on an isomeric form of the compound.

(b) The melting point 76 is found in references 32, 34, 38, 41, 46, 47, 48.

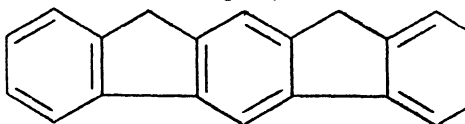
1,2,3,4,5,6-Tribenzocyclooctene-7



M. P., °C

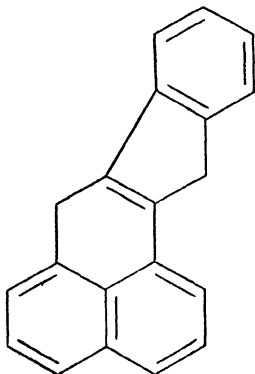
138.5–139⁴⁴

**2,3-(2',3'-Indo)-fluorene
(Ellagene)**

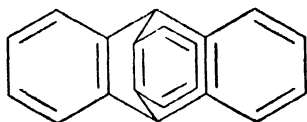


M. P., °C

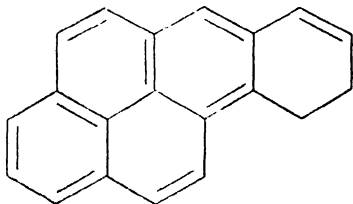
197³⁸

2,3-(3',2'-Indo)-phenalene

M. P., °C
185¹¹

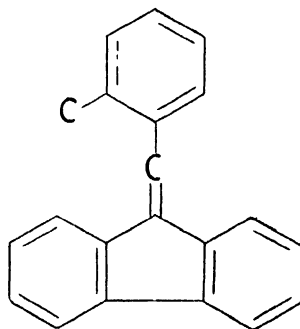
9,10-Endo-o-phenylene-9,10-dihydro-anthracene
 (Tryptylene)


M. P., °C
254.8-255.2⁵

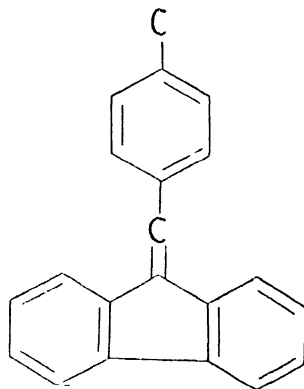
2,3-(Cyclohexen-3'-o)-pyrene (a)

M. P., °C
149.5-150.0¹
148-149²¹

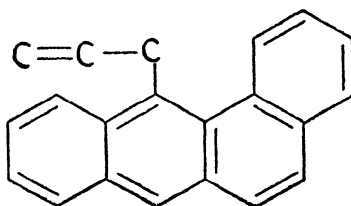
(a) Reference 31 gives evidence that this compound may possibly be cyclohexano-[def]-chrysene.

 $C_{21}H_{16}$ **9-(2'-Methylbenzylidene)-fluorene**

M. P., °C
109.5¹⁵

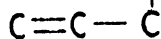
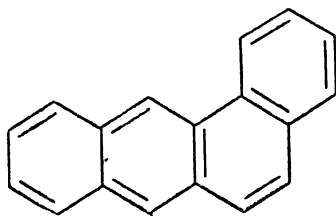
9-(4'-Methylbenzylidene)-fluorene

M. P., °C
97.5¹⁵

1,2-Benzo-9-(propen-2'-yl)-anthracene

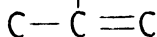
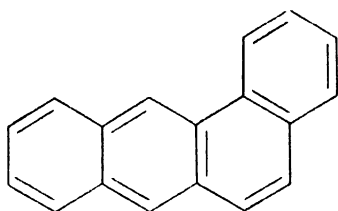
M. P., °C
115-116²⁶

1,2-Benzo-10-(propen-2'-yl)-anthracene



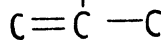
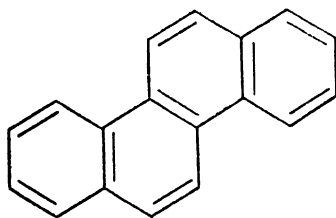
M. P., °C
125.5–126.5²⁵

1,2-Benzo-5-isopropenylanthracene



M. P., °C
137–139¹⁴

6-Isopropenylchrysene

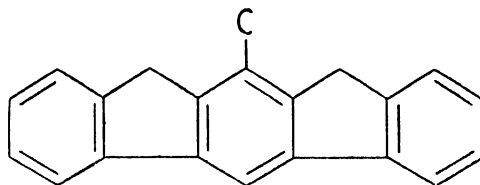


M. P., °C
161⁷

B. P., °C @ 760mm
220

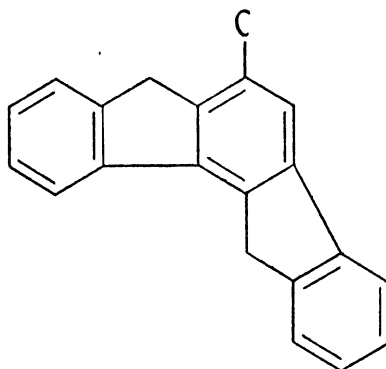
27

1-Methyl-2,3-(2',3'-indo)-fluorene
(Isophthalacene)



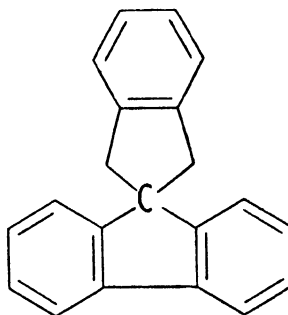
M. P., °C
222²⁰

1-Methyl-3,4-(3',2'-indo)-fluorene
(Phthalacene)

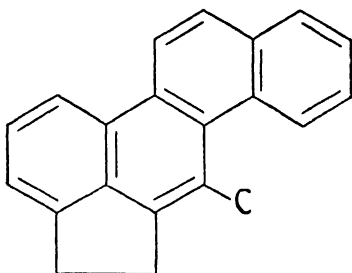


M. P., °C
173³⁰

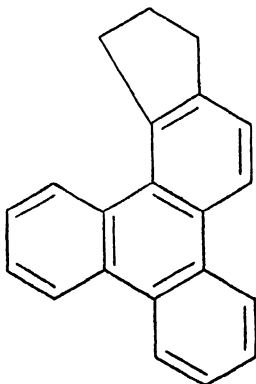
Spiro[3,4-benzocyclopentane-1,9'-fluorene]



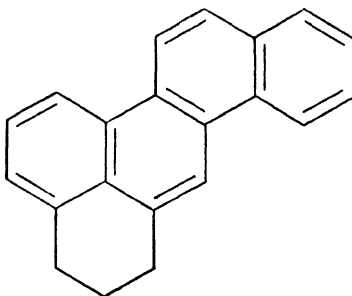
M. P., °C
220²¹

Cyclopentano-[hi]-5-methylchrysene

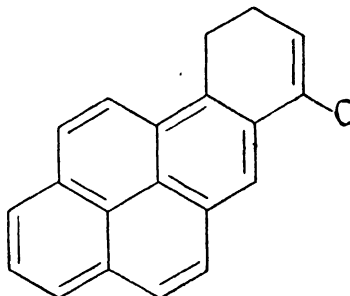
M. P., °C
169–169.5²

1,2-Cyclopentanotriphenylene

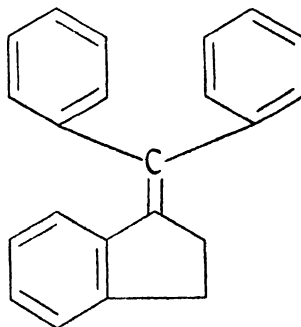
M. P., °C
171–172.5⁶
115–116⁵²

Cyclohexano-[hi]-chrysene

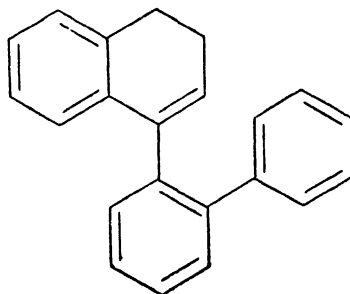
M. P., °C
116.5–117^{29, 43}

1,2-(6'-Methylcyclohexen-5'-o)-pyrene

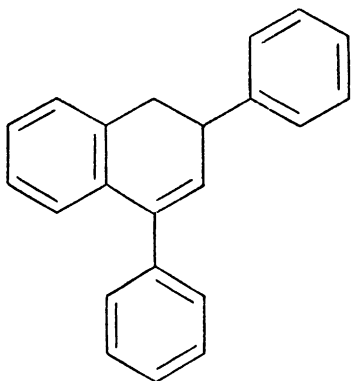
M. P., °C
162–163²⁷
155–156²³

 $C_{22}H_{18}$ **1-Benzhydrylidencindane**

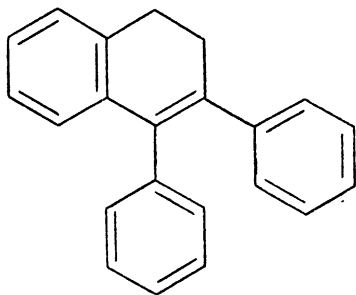
M. P., °C
92¹⁶

4-o-Biphenyl-1,2-dihydronaphthalene

M. P., °C
75.5–76.5⁹

2,4-Diphenyl-1,2-dihydronaphthalene

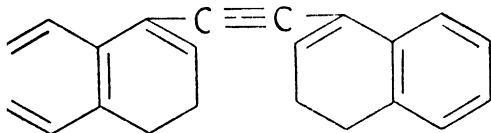
M. P., °C
136¹²

3,4-Diphenyl-1,2-dihydronaphthalene

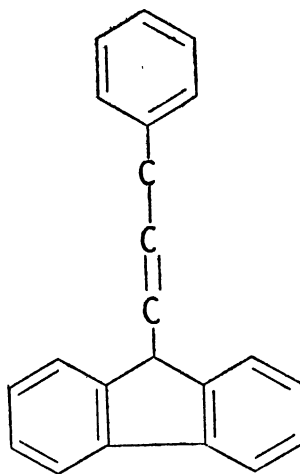
M. P., °C
94-95⁸
76.5-77¹²
76¹³

B. P., °C @ 760mm
210-215

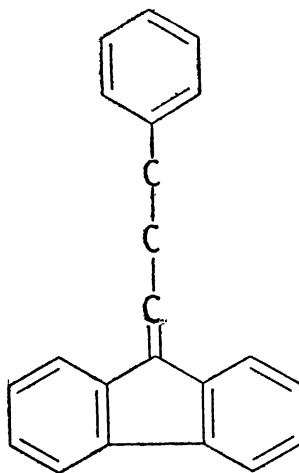
0.5⁸

Di-1-(3,4-dihydronaphthyl)-ethyne

M. P., °C
124¹⁷
120-121⁴⁰

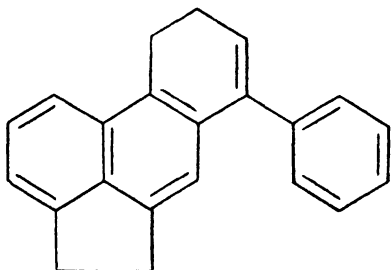
1-(9'-Fluoryl)-3-phenylpropene-1

M. P., °C
88³³, 47

1-Phenyl-3-(9'-fluorylidene)-propane

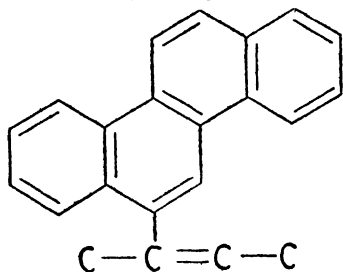
M. P., °C
81-82⁴⁷
81³³

Cyclopentano-[jk]-1-phenyl-3,4-dihydrophenanthrene



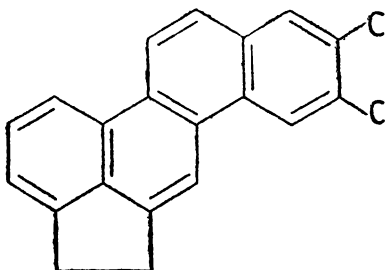
M. P., °C
144²⁸

6-(2'-Buten-2'-yl)-chrysene



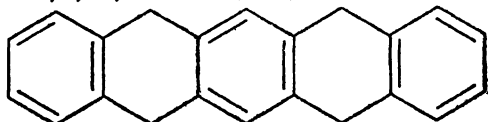
M. P., °C
159–160⁷

Cyclopentano-[hi]-2,3-dimethylchrysene



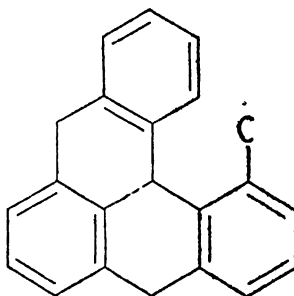
M. P., °C
222.6–223.1²⁴

5,7,12,14-Tetrahydropentacene



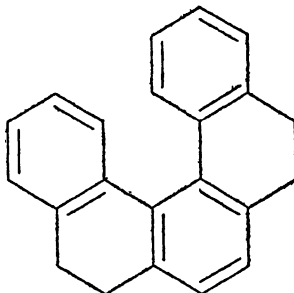
M. P., °C
244–245³⁰
240–241³⁶

2,3-Benzo-4,5-(3'-methylbenzo)-3a,6-dihydrophenalene



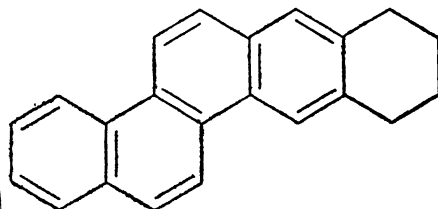
M. P., °C
182⁵¹

3,4,5,6-Dibenzo-1,2,7,8-tetrahydrophenanthrene

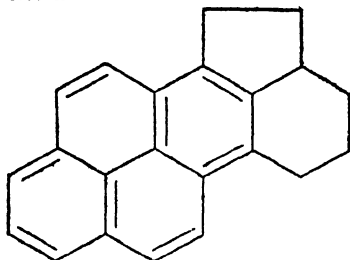


M. P., °C
142⁵⁰

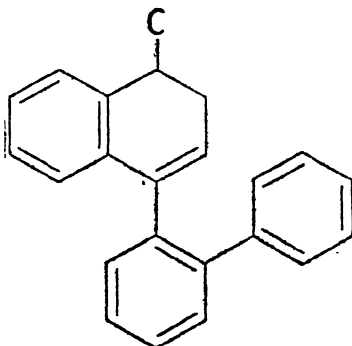
2,3-Cyclohexanochrysene



M. P., °C
217–218¹⁵

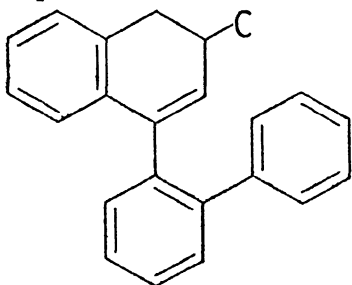
Benzo-[hij]-2a,3,4,5-tetrahydrocholanthrene

M. P., °C

227.5–228.5³⁵C₂₃H₂₀**1-Methyl-4-o-biphenyl-1,2-dihydronaphthalene**

B. P., °C @ 760mm

215–218

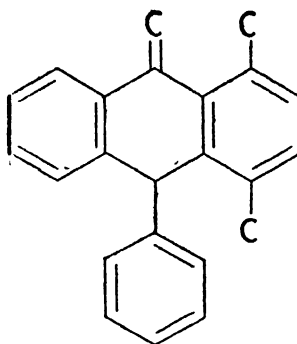
6–7¹⁰**2-Methyl-4-o-biphenyl-1,2-dihydronaphthalene**

M. P., °C

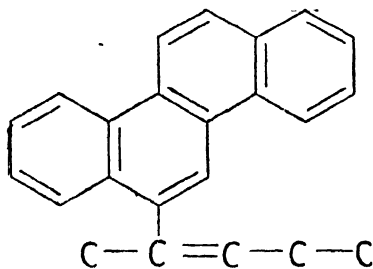
77–78¹⁰

B. P., °C @ 760mm

218–220

8–9¹⁰**1,4-Dimethyl-9-methylene-10-phenyl-9,10-dihydroanthracene**

M. P., °C

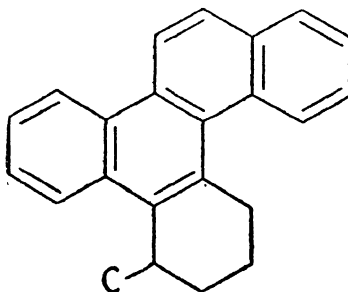
129⁴**6-(2'-Penten-2'-yl)-chrysene**

M. P., °C

102⁷

B. P., °C @ 760mm

210–215

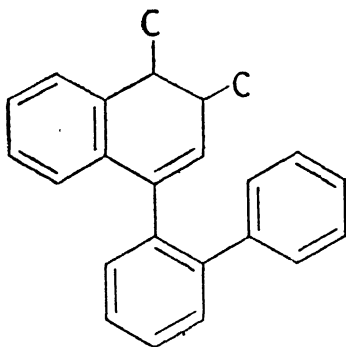
0.1⁷**5,6-(6'-Methylcyclohexano)-chrysene**

M. P., °C

139⁷



1,2-Dimethyl-4-o-biphenyl-1,2-dihydronaphthalene



M. P., °C

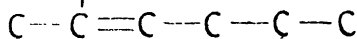
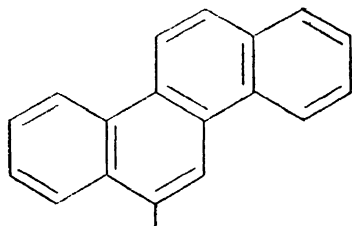
78-79.5¹⁰

B. P., °C @ 760mm

217-218

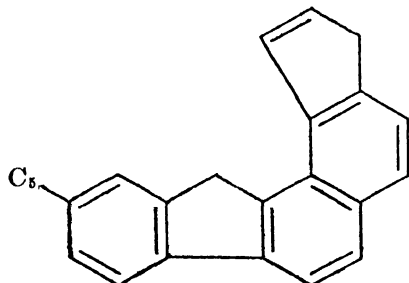
8¹⁰

6-(2'-Hexen-2'-yl)-chrysene



B. P., °C @ 760mm

230-235

0.1⁷1,2-(4',5'-Indo)-7-pentylfluorene
(Diels' Hydrocarbon II) (a)

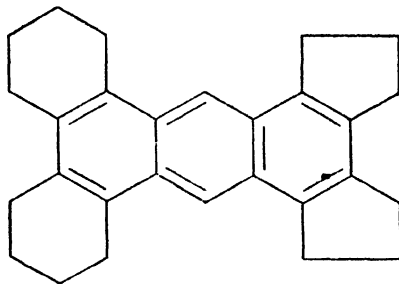
M. P., °C

220¹⁸219¹⁹

- (a) Although the above structure was assigned by Diels, it is not generally accepted as definite.



1,2,3,4-Dicyclopentano-5,6,7,8-dicyclohexanoanthracene



M. P., °C

342-344³References on Miscellaneous Polynuclear
Aromatics of Empirical Formula C_nH_{2n-26}

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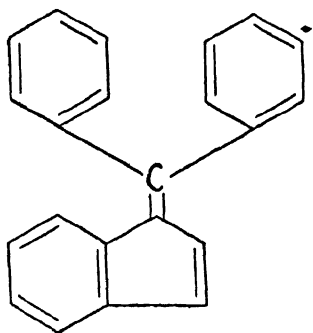
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XI. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-28}

1. Indene Derivatives of Empirical Formula C_nH_{2n-28}
2. Naphthalene with Two Phenyl or One Biphenyl Substitutions
3. Benzopyrenes and Their Alkyl Derivatives
4. Miscellaneous Polynuclear Aromatics of Empirical Formula C_nH_{2n-28}

1. INDENE DERIVATIVES OF EMPIRICAL FORMULA C_nH_{2n-22} $C_{22}H_{16}$

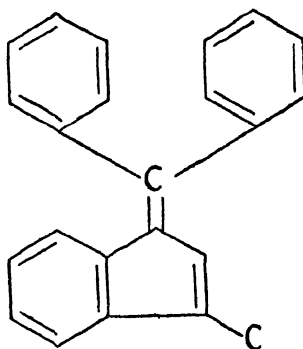
1-Benzhydrylideneindene



M. P., °C

114.5⁷111–112^{2, 4} $C_{23}H_{18}$

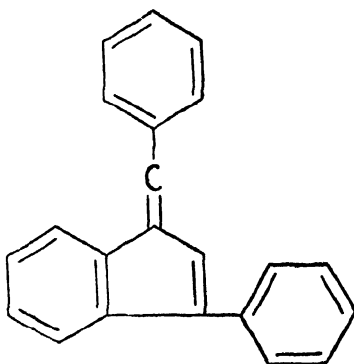
1-Benzhydrylidene-3-methylindene



M. P., °C

120–121⁹

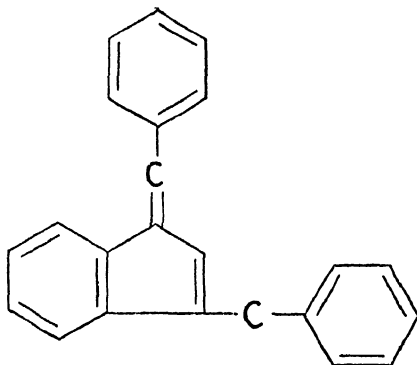
1-Benzylidene-3-phenylindene



M. P., °C

77.5⁵

1-Benzylidene-3-benzylindene

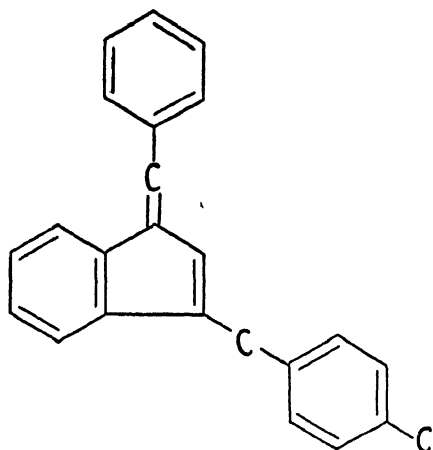


M. P., °C

137–138¹137.5⁸137–137.5⁶

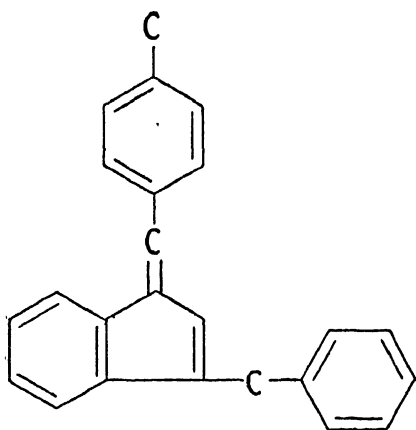
$C_{24}H_{20}$

1-Benzylidene-3-(4'-methylbenzyl)-indene



M. P., °C
106-107¹

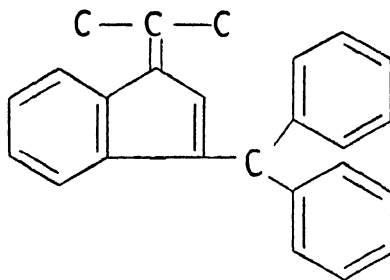
1-(4'-Methylbenzylidene)-3-benzylindene



M. P., °C
98-100¹
94²

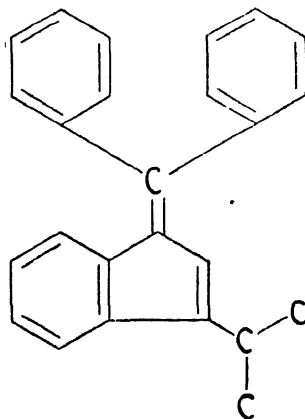
 $C_{26}H_{22}$

1-Isopropylidene-3-benzhydrylindene



M. P., °C
174-175°

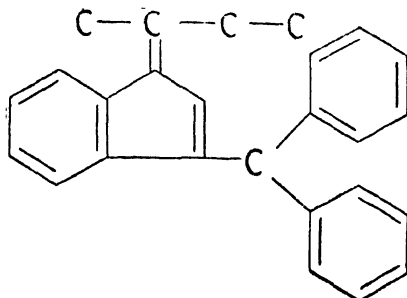
1-Benzhydrylidene-3-isopropylindene



M. P., °C
127-128°

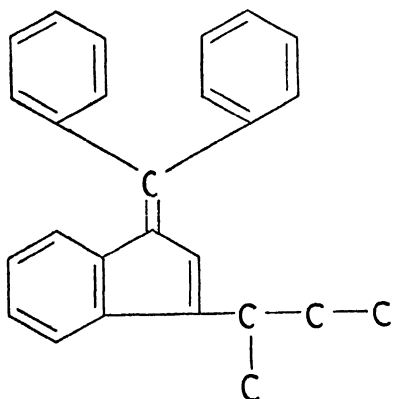
 $C_{26}H_{24}$

1-sec-Butylidene-3-benzhydrylindene



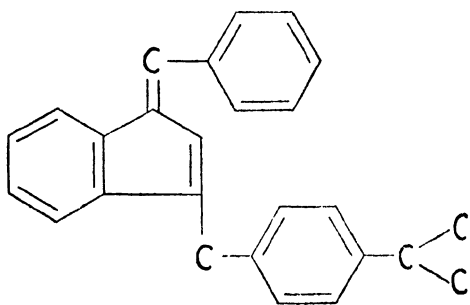
M. P., °C
149.5–151⁹

1-Benzhydrylidene-3-sec-butylindene



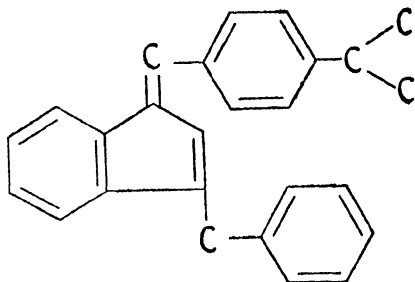
M. P., °C
91–92⁹

1-Benzylidene-3-(4'-isopropylbenzyl)-indene



M. P., °C
105–107¹

1-(4'-Isopropylbenzylidene)-3-benzylindene



M. P., °C
93–94¹

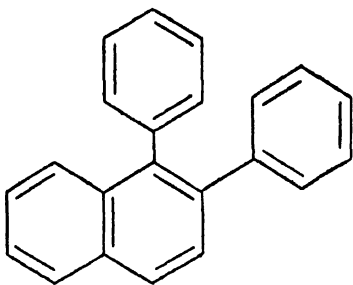
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Formula C_nH_{2n-28}*

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2. NAPHTHALENE WITH TWO PHENYL OR ONE BIPHENYLYL SUBSTITUTIONS, $C_{22}H_{16}$

$C_{22}H_{16}$

1,2-Diphenylnaphthalene

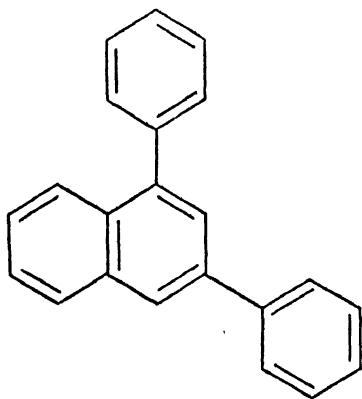


M. P., °C

114⁵

109.5–110¹¹

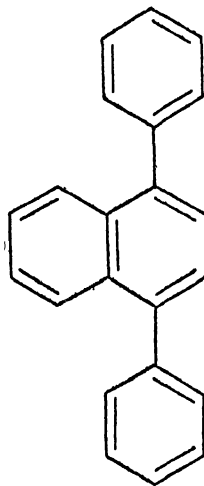
1,3-Diphenylnaphthalene



M. P., °C

70–71¹¹

1,4-Diphenylnaphthalene



M. P., °C

135–137³⁸

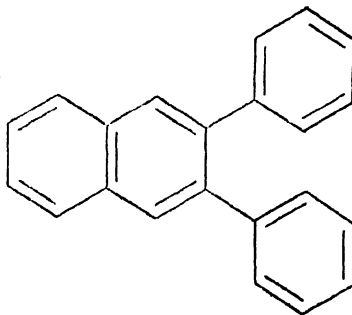
135–136^{13, 14}

134–136¹

133³¹

132–133³⁰

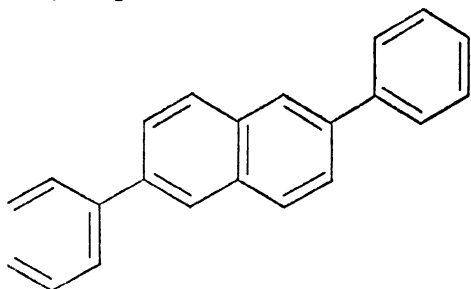
2,3-Diphenylnaphthalene



M. P., °C

86–87¹¹

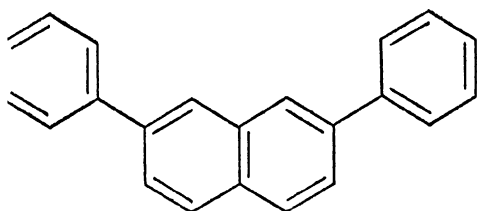
2, 6-Diphenylnaphthalene



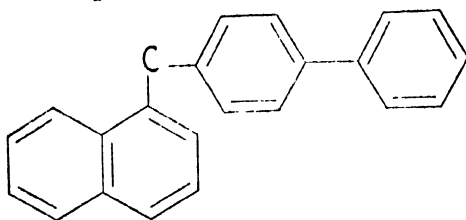
M. P., °C

233-234³¹230²⁸

2, 7-Diphenylnaphthalene



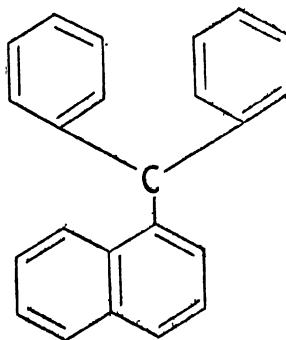
M. P., °C

143²¹C₂₃H₁₈1-Naphthyl-*p*-biphenylmethane

M. P., °C

146²⁷

1-Benzhydrylnaphthalene



M. P., °C

150

152²⁵150.5^{33, 34}

150 (a)

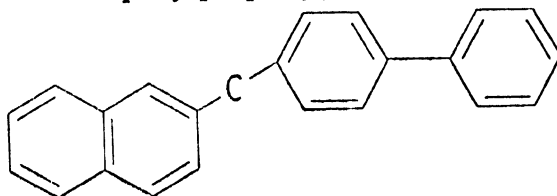
149.5²²149 (b)^{6, 7, 8, 23}148-149¹⁰134 (b)^{6, 7, 8, 23} D_4^{20}

1.190

(j)³⁷

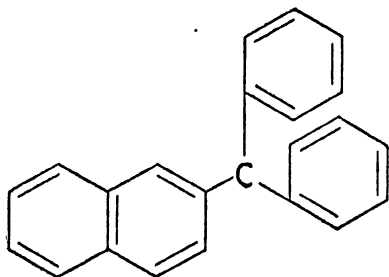
(a) The melting point 150 is found in references 1, 2, 3, 20, 24, 32, 38.

(b) These constants were determined on different crystalline forms.

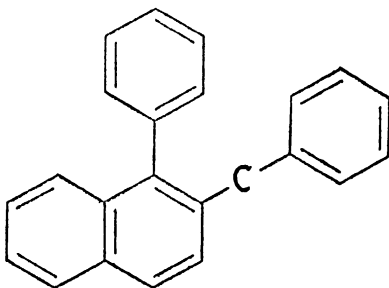
2-Naphthyl-*p*-biphenylmethane

M. P., °C

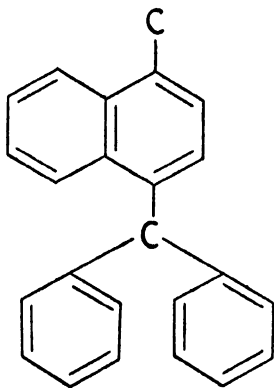
111²⁶

2-Benzhydrylnaphthalene

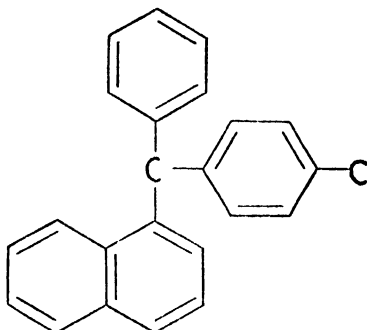
M. P., °C
77-78¹⁹
73-74²⁶

1-Phenyl-2-benzyl-naphthalene

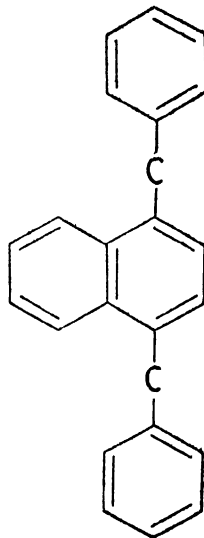
M. P., °C
87-88⁹

 $C_{24}H_{20}$
1-Methyl-4-benzhydrylnaphthalene

M. P., °C
149⁶

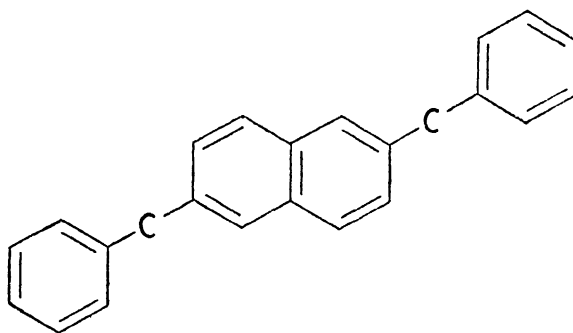
Phenyl-*p*-tolyl-1-naphthylmethane

M. P., °C
133¹²

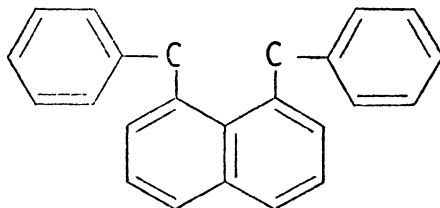
1, 4-Dibenzyl-naphthalene

M. P., °C
88^{15, 16, 17}

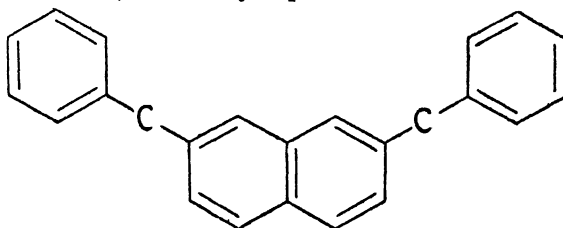
This series continued on next page

2, 6-Dibenzyl-naphthalene

M. P., °C
123¹⁸

1, 8-Dibenzyl-naphthalene

M. P., °C
146.5^{15, 16, 35}

2, 7-Dibenzyl-naphthalene

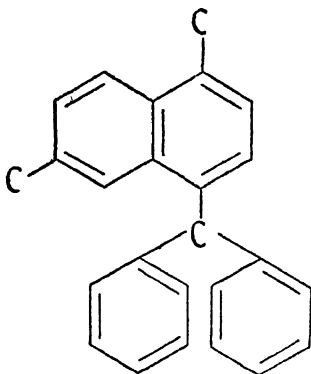
M. P., °C
91¹⁸

x, x-Dibenzyl-naphthalene (a)

M. P., °C
132¹⁵

B. P., °C @ 760mm
265–275 92⁹

- (a) The structure of this compound was not clearly defined in the literature.

**1, 6-Dimethyl-4-benzhydrylnaphthalene**

M. P., °C

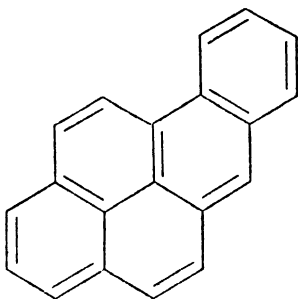
134-135°

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3. BENZOPYRENES AND THEIR ALKYL DERIVATIVES, C_nH_{2n-2} 

1,2-Benzopyrene



M. P., °C

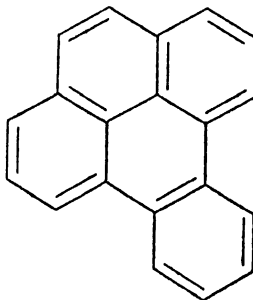
177.8

178.6–179.8²178.8–179.3¹⁰178.5–179⁸178.5–179 (a)¹⁸176.5–177.5^{5, 14}176.5–177.5 (a)¹⁷177^{22, 23}176.5–177⁷176.3–177.0⁶175.5–176.5¹⁴176²⁴174–176 (a)¹⁵175¹⁹ D_4^{20} 1.351 (solid)¹²1.282 (b) (solid)¹²

(a) This compound was given as 1,2-Benzopyrene in the literature, but no structural formula or indication of the numbering system used was given.

(b) The temperature of this determination was not given.

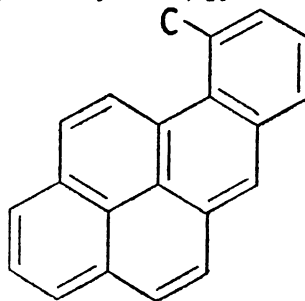
4,5-Benzopyrene



M. P., °C

178–179⁶178⁴174¹¹

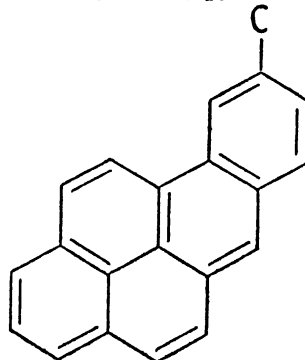
1,2-(3'-Methylbenzo)-pyrene



M. P., °C

190–191¹³190–190.8¹

1,2-(4'-Methylbenzo)-pyrene



M. P., °C

139–140 (a)¹138–139 (b)⁸

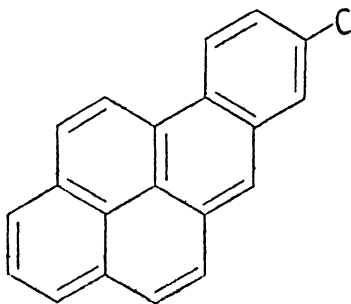
B. P., °C @ 760mm

175

0.01¹

(a) This compound remelts at 140–140.4.

(b) This compound remelts at 140–140.2.

1, 2-(5'-Methylbenzo)-pyrene

M. P., °C

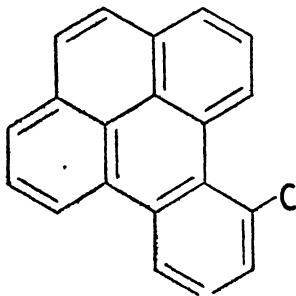
147.5–148 (a)¹146.5–147.5⁸146.5–147 (a)⁸

B. P., °C @ 760mm

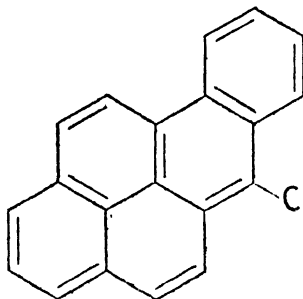
220

0.01¹

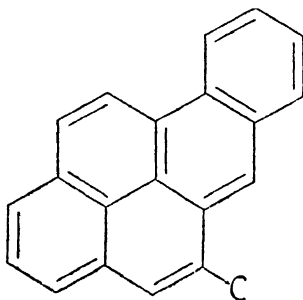
(a) This compound remelts at 147.6–148.1.

4, 5-(3'-Methylbenzo)-pyrene

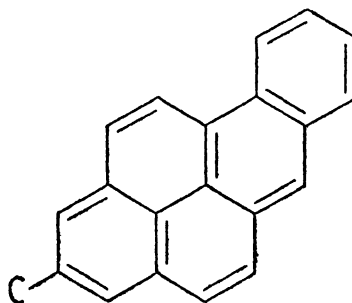
M. P., °C

219.5–220¹⁰217.5–218¹⁰**3-Methyl-1, 2-benzopyrene**

M. P., °C

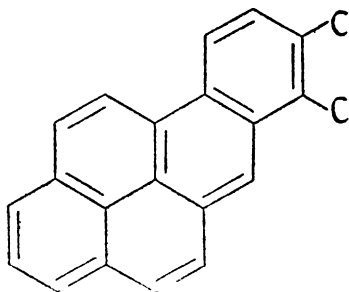
216.6–217.3⁶216.2–216.7⁹215.7–216.2⁹**4-Methyl-1, 2-benzopyrene**

M. P., °C

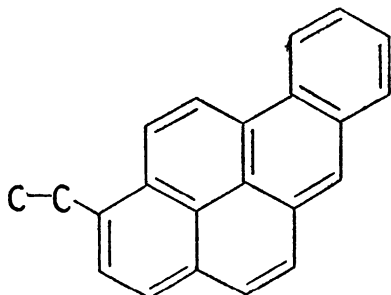
171–172.5¹⁶171–172²⁰171–171.5⁹**7-Methyl-1, 2-benzopyrene**

M. P., °C

157.5–159.5³

**1, 2-(5', 6'-Dimethylbenzo)-pyrene**

M. P., °C
215-216¹

8-Ethyl-1, 2-benzopyrene

M. P., °C
112²¹

*References on Benzopyrenes and Their
Alkyl Derivatives*

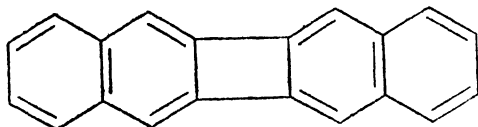
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4. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-28}

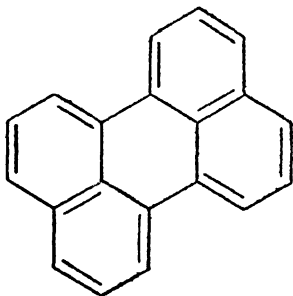


1,2,3,4-Di-(3',2'-naphtho)-cyclobutane



M. P., °C
365 ± 2⁵⁰

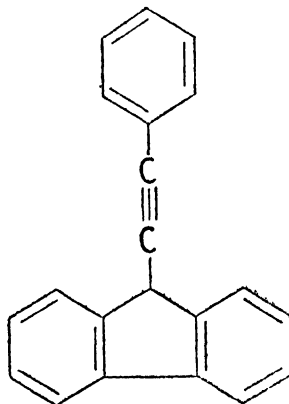
Perylene



M. P., °C
275
277.9–279.1²⁸
279⁴⁹
278⁴⁶
274³³
273–274⁴⁴
273⁶³
272–273²⁵
271⁶⁴
267⁴⁸
266¹²
265³³

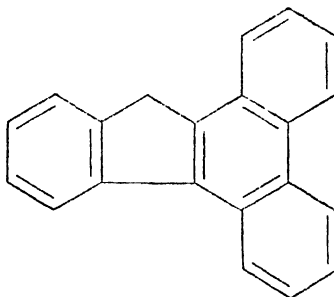


Phenyl-(9'-fluoryl)-ethyne

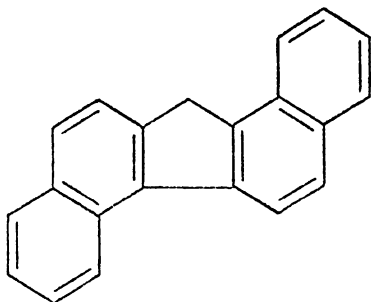


M. P., °C
98–100³⁴

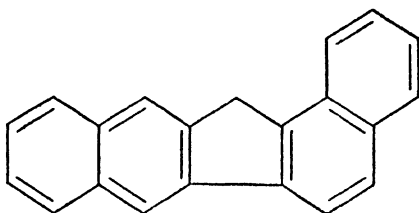
1,2,3,4-Dibenzofluorene



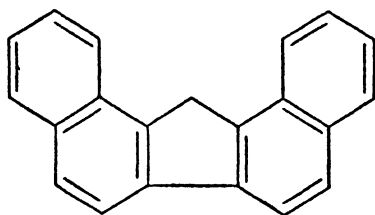
M. P., °C
158–160⁶⁷
158–159⁷
157.5–158.5⁴³

1,2,5,6-Dibenzofluorene

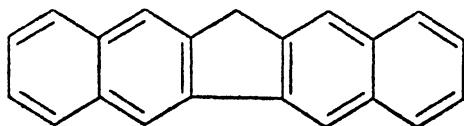
M. P., °C
171-172²¹

1,2,6,7-Dibenzofluorene

M. P., °C
294²⁴

1,2,7,8-Dibenzofluorene

M. P., °C
242.5⁵³
234¹³
232¹⁴
230¹⁰
228-230³⁶

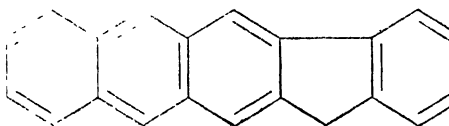
2,3,6,7-Dibenzofluorene

M. P., °C
282.5-283.5⁴²
281-282²⁴

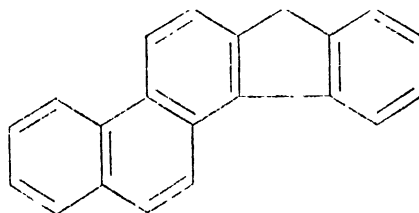
x, x, x, x-Dibenzofluorene (a)

M. P., °C
306⁴
190.5⁵²

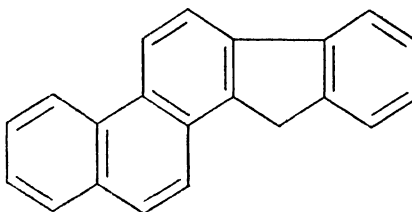
(a) The structure of these compounds was not clearly defined in the literature.

2,3-(3',2'-Indo)-anthracene

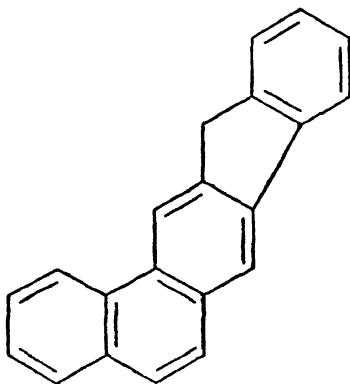
M. P., °C
317⁵

1,2-(3',2'-Indo)-phenanthrene

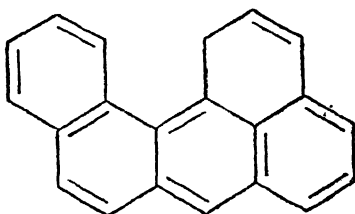
M. P., °C
189¹¹

1,2-(2',3'-Indo)-phenanthrene

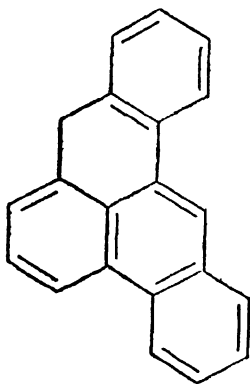
M. P., °C
338-339²⁰
328²
327-328^{22, 23}

2,3-(3',2'-Indo)-phenanthrene

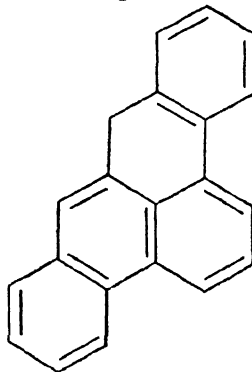
M. P., °C
226-226.5²¹

8,9-(2',1'-Naphtho)-phenalene

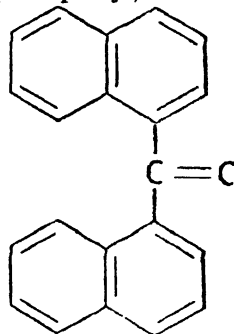
M. P., °C
149-149.5^{28a}

2,3,5,6-Dibenzophenalene

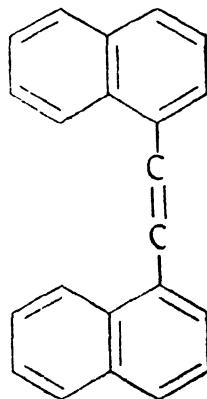
M. P., °C
128-129¹⁵

2,3,7,8-Dibenzophenalene

M. P., °C
171-172.5¹⁵

 $C_{22}H_{16}$ **1,1-Di-(1'-naphthyl)-ethene**

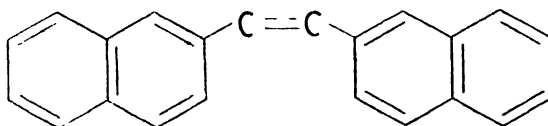
M. P., °C
107⁴⁷

1,2-Di-(1'-naphthyl)-ethene

M. P., °C

161–162⁵⁴161^{8, 28, 61}160⁴⁵158.5–159³⁰

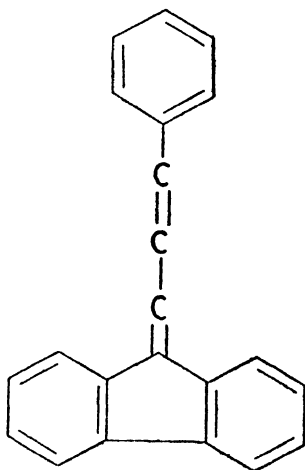
1,2-Di-(2'-naphthyl)-ethene



M. P., °C

255⁶¹254–255^{29, 60}253–254⁵⁴

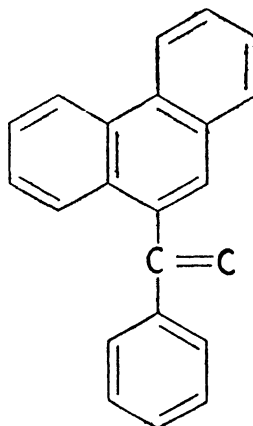
1-Phenyl-3-(9'-fluorylidene)-propene-1



M. P., °C

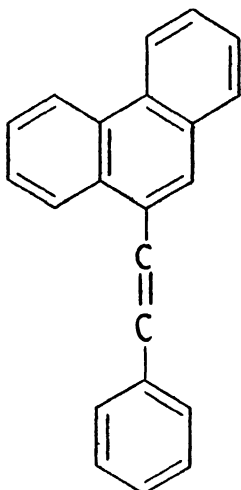
155³⁵154–155⁶²154.5⁵⁵

1-Phenyl-1-(9'-phenanthryl)-ethene



M. P., °C

142⁸

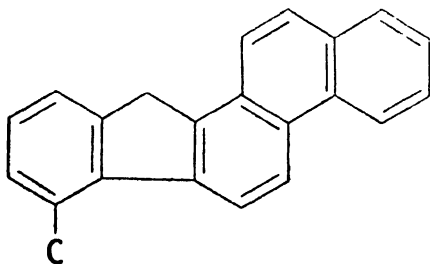
1-Phenyl-2-(9'-phenanthryl)-ethene

M. P., °C
118⁶

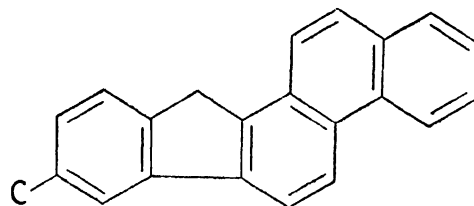
x-Phenyl-x, x-dihydrobenzo-[jk]-fluorene (a)

M. P., °C
148⁵⁶

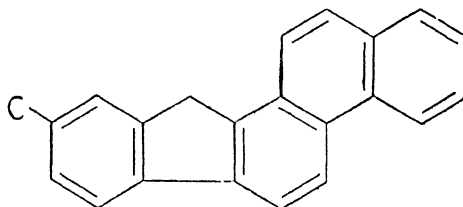
(a) The structure of this compound was not clearly defined in the literature.

1,2-(2',1'-Naphtho)-5-methylfluorene

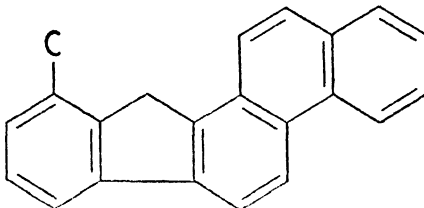
M. P., °C
275-276²
275⁵¹

1,2-(2',1'-Naphtho)-6-methylfluorene

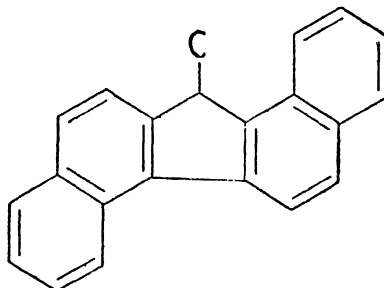
M. P., °C
330²

1,2-(2',1'-Naphtho)-7-methylfluorene

M. P., °C
334-336²
301¹³

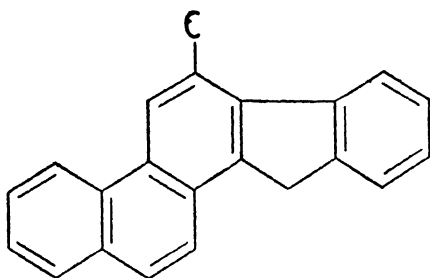
1,2-(2',1'-Naphtho)-8-methylfluorene

M. P., °C
281-281.5²

1,2,5,6-Dibenzo-9-methylfluorene

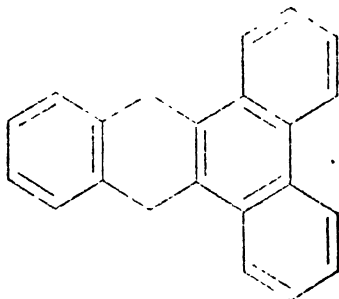
M. P., °C
144–145²⁴

1,2-(2',3'-Indo)-3-methylphenanthrene



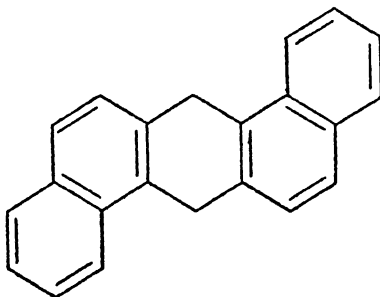
M. P., °C
202–203²

1,2,3,4-Dibenzo-9,10-dihydroanthracene



M. P., °C
202–203³

1,2,5,6-Dibenzo-9,10-dihydroanthracene



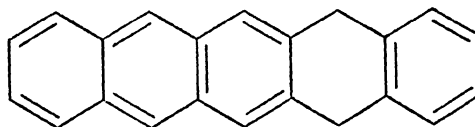
M. P., °C
218.5–219.5¹
196–198¹⁹

1,2-Benzo-x,x-dihydronaphthacene
(a)

M. P., °C
157–160.5³

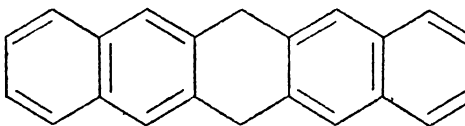
(a) The hydrogens may be in either the 5,8- or 9,10-positions.

5,14-Dihydropentacene



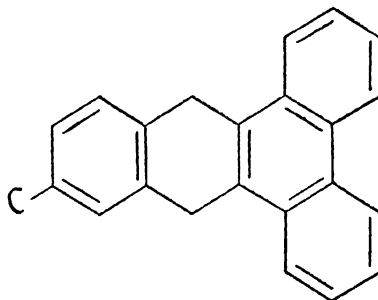
M. P., °C
273¹⁶

6,13-Dihydropentacene



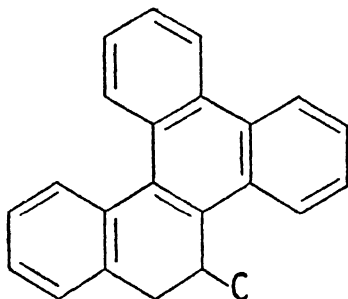
M. P., °C
271–272⁴¹
270^{17, 39, 40}

1,2,3,4-Dibenzo-6-methyl-9,10-dihydroanthracene

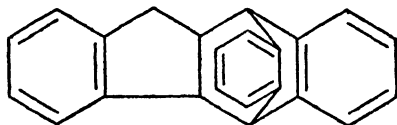


M. P., °C
207–209.5³

11,12-Benzo-5-methyl-5,6-dihydrochrysene



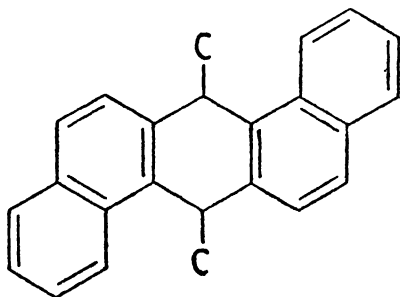
M. P., °C
151-152⁹

1,4-*o*-Endophenylene-2,3-benzo-1,4,4a,9a-tetrahydrofluorene

M. P., °C
118³⁷

 $C_{21}H_{20}$

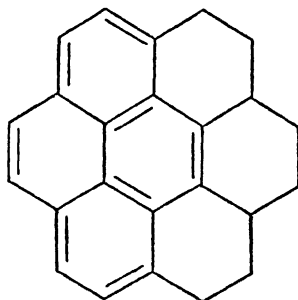
1,2,5,6-Dibenzo-9,10-dimethyl-9,10-dihydroanthracene



M. P., °C
277-278 (a)¹⁸
207-209 (b)¹⁸

- (a) This constant was determined on the *trans* isomer of the compound.
(b) This constant was determined on the *cis* isomer of the compound.

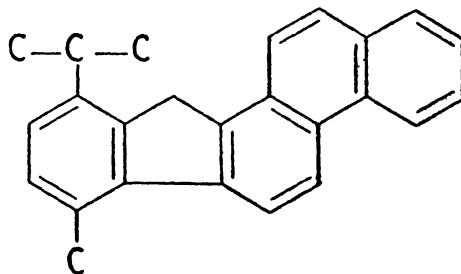
1,2,2a,3,4,4a,5,6-Octahydrocoronene



M. P., °C
269-270³⁰

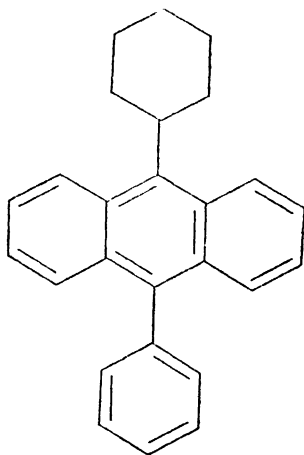
 $C_{25}H_{22}$

1,2-(2',1'-Naphtho)-5-methyl-8-isopropylfluorene



M. P., °C
198^{22, 23}

C₂₆H₂₄
9-Cyclohexyl-10-phenylanthracene



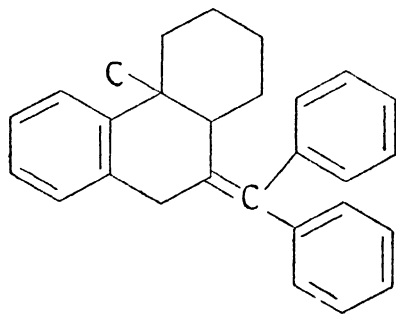
M. P., °C
 231–232⁵⁹, 59

C₂₇H₂₆
2,7-Dibenzyl-x₄-tetrahydrofluorene
 (a)

M. P., °C
 90–91²⁷

(a) The structure of this compound was not clearly defined in the literature.

C₂₈H₂₈
4a-Methyl-10-benzhydrylidene-1,2,3,4,4a,9,10,10a-octahydrophenanthrene



M. P., °C
 126³¹

C₃₀H₃₂

1-Methyl-7-isopropyl-x, x-diphenyl-x₆-hexahydrophenanthrene (a)

M. P., °C
 82³²

(a) The structure of this compound was not clearly defined in the literature.

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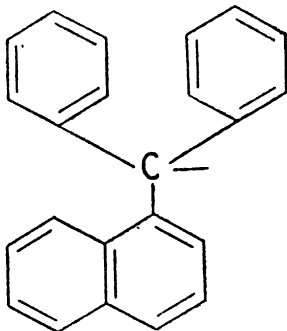
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XII. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-2}

XII. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-29}

$C_{23}H_{17}$

Diphenyl-(1-naphthyl)-methyl



M. P., °C
135-137^{1, 2}

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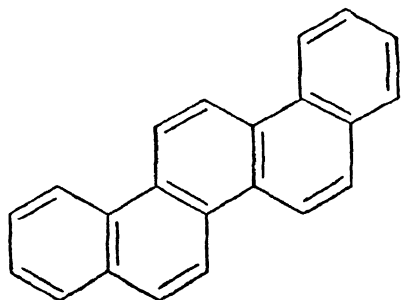
XIII. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-30}

1. Picene and Its Alkyl Derivatives
2. Dibenzoanthracenes, Dibenzophenanthrenes, and Their Alkyl Derivatives
3. Miscellaneous Polynuclear Aromatics of Empirical Formula C_nH_{2n-30}

1. PICENE AND ITS ALKYL DERIVATIVES, C_nH_{2n-8}

$C_{22}H_{14}$

Picene



M. P., °C

365

366.0–366.5⁶

365–366^{11, 14, 18}

363.5–361.5³

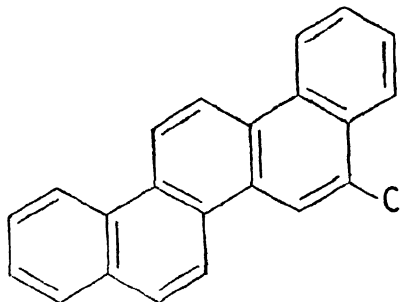
364^{1, 2, 16}

B. P., °C @ 760mm

518–520⁴

$C_{23}H_{16}$

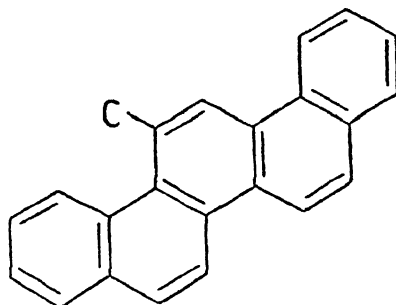
5-Methylpicene



M. P., °C

251.6–252.2⁶

13-Methylpicene

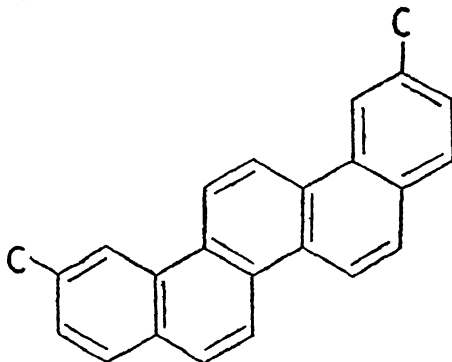


M. P., °C

203.6–204.4⁶

$C_{24}H_{18}$

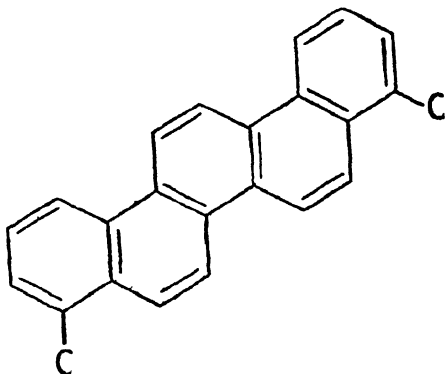
2, 11-Dimethylpicene



M. P., °C

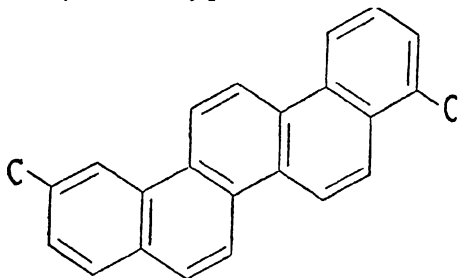
293–294¹²

4, 9-Dimethylpicene



M. P., °C
 380-381¹⁰
 370-371⁷

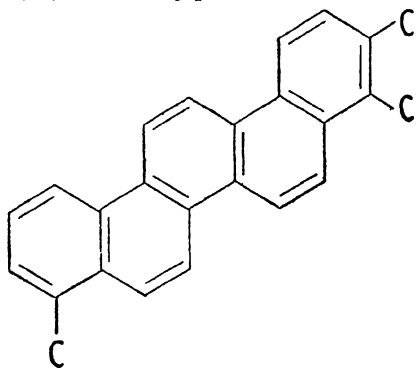
4, 11-Dimethylpicene



M. P., °C
 306^{10, 13}
 305-306^{8, 9}

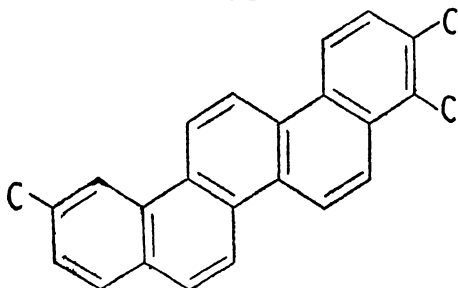
C₂₆H₂₀

3, 4, 9-Trimethylpicene



M. P., °C
 380-381¹⁰
 372-373⁷

3, 4, 11-Trimethylpicene



M. P., °C
 309-310¹⁰
 308-310¹²

B. P., °C @ 760mm
 270 0.1¹²

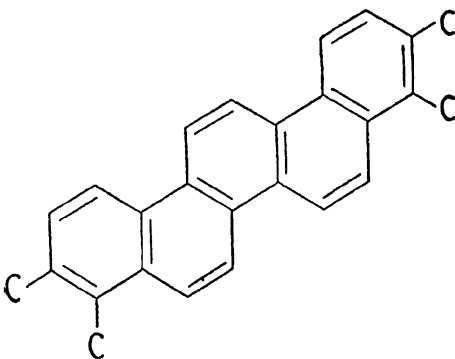
x, x, x-Trimethylpicene (a)

M. P., °C
 306¹⁵
 305-306¹⁷
 298⁵

(a) The structure of this compound was not clearly defined in the literature.

C₂₆H₂₂

3, 4, 9, 10-Tetramethylpicene



M. P., °C
 400-401¹⁰

References on Picene and Its Alkyl Derivatives

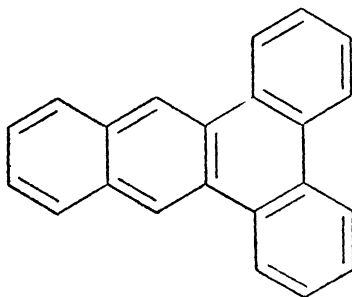
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2. DIBENZOANTHRACENES, DIBENZOPHENANTHRENES, AND THEIR ALKYL DERIVATIVES, C_nH_{2n-30}



1, 2, 3, 4-Dibenzoanthracene



M. P., °C

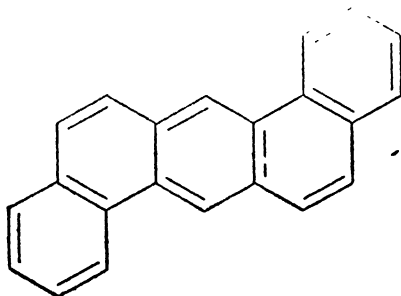
205⁷

203-204¹⁶

200-202²

200-201.5⁴

1, 2, 5, 6-Dibenzoanthracene



M. P., °C

264.5

266.6-266.9¹⁷

266-266.5²⁰

265.5-266.0²⁶

263.5-264.5²⁵

262.7-264.0¹⁷

262^{6, 29}

261-262²²

261-261.5^{16, 18}

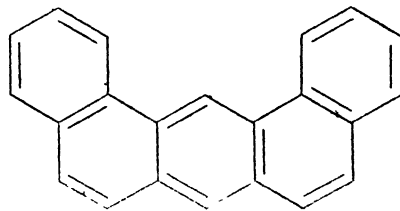
260²⁴

*D*₄²⁰

1.282 (a)²⁴

(a) The temperature of this determination was not given.

1, 2, 7, 8-Dibenzoanthracene



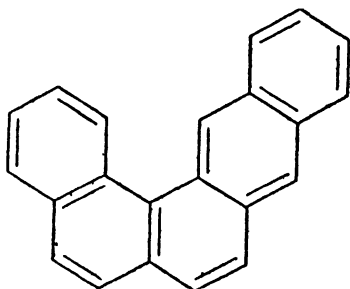
M. P., °C

198.0-198.4¹⁷

196¹⁴

195-196²⁷

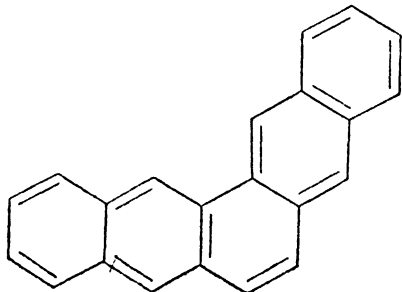
2,3,5,6-Dibenzophenanthrene



M. P., °C

261¹¹137–138²³

2,3,6,7-Dibenzophenanthrene



M. P., °C

257⁸255–257³⁰250–251¹⁰

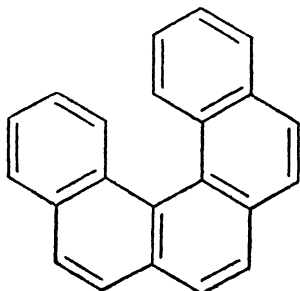
Additional Data

Sublimation Temp. (°C)

230

12mm¹⁰

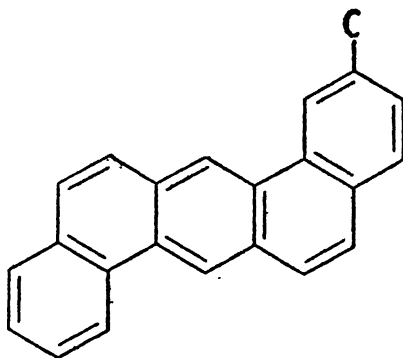
3,4,5,6-Dibenzophenanthrene



M. P., °C

177–178¹⁵177²⁸145–146²⁹C₂₃H₁₆

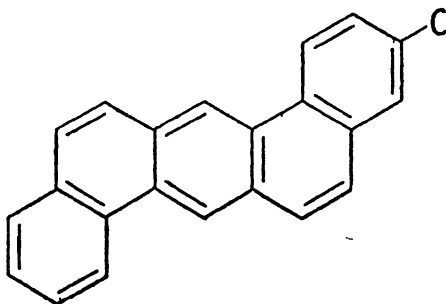
1,2-(4'-Methylbenzo)-5,6-benzo-anthracene



M. P., °C

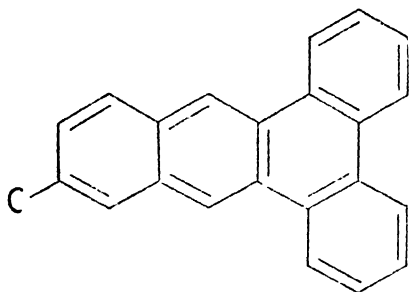
256–257.5^{12, 13}

1,2-(5'-Methylbenzo)-5,6-benzo-anthracene

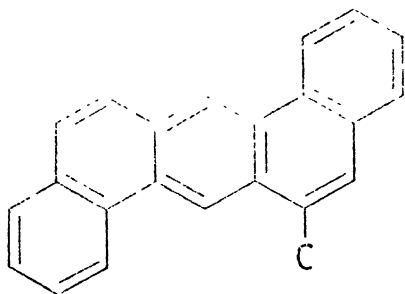


M. P., °C

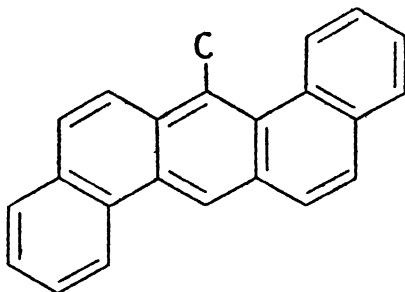
245^{12, 13, 16}244–245¹⁹

1,2,3,4-Dibenzo-6-methylanthracene

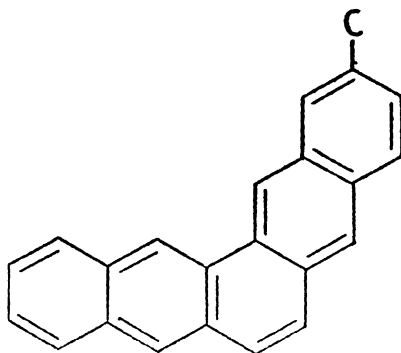
M. P., °C
157.5–158⁴

1,2,5,6-Dibenzo-4-methylanthracene

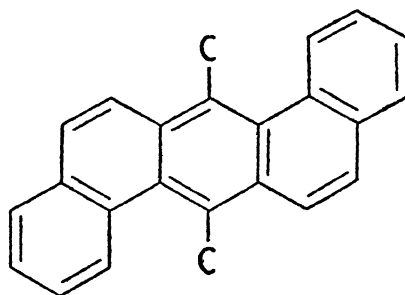
M. P., °C
184–185¹⁶

1,2,5,6-Dibenzo-9-methylanthracene

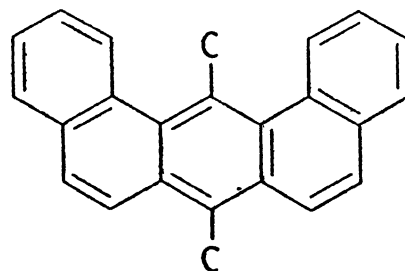
M. P., °C
192–194.5²¹

2,3-(4'-Methylbenzo)-6,7-benzo-phenanthrene

M. P., °C
315–316⁹

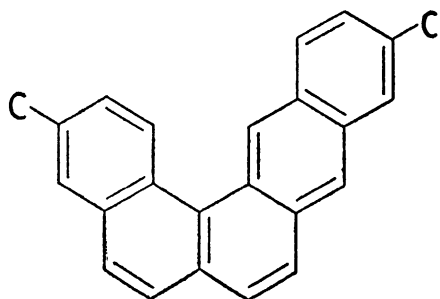
 $C_{24}H_{18}$ **1,2,5,6-Dibenzo-9,10-dimethylanthracene**

M. P., °C
205.5–206.5^{3,13}
203–204¹

1,2,7,8-Dibenzo-9,10-dimethylanthracene

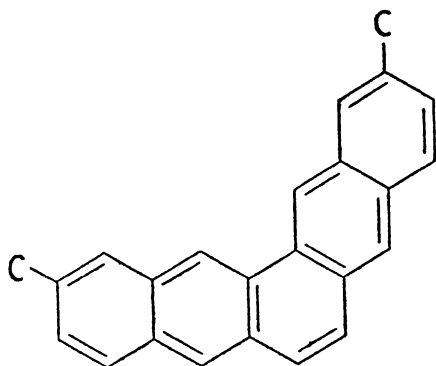
M. P., °C
205.5–206.5¹²

2,3-(5'-Methylbenzo)-5,6-(4'-methylbenzo)-phenanthrene



M. P., °C
228¹¹

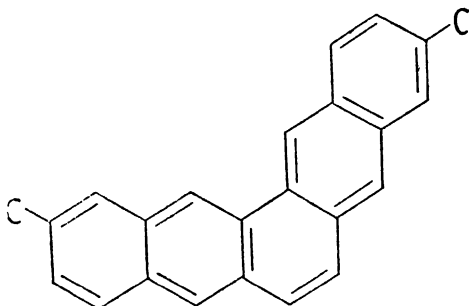
2,3-(4'-Methylbenzo)-6,7-(5'-methylbenzo)-phenanthrene (a)



M. P., °C
325⁵

(a) More information about this compound is found in references 8 and 10. The physical constants in these references were found to be in error.

2,3,6,7-Di-(5'-methylbenzo)-phenanthrene (a)

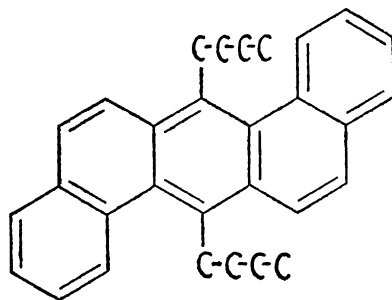


M. P., °C
325⁵

(a) More information about this compound is found in references 8 and 10. The physical constants in these references were found to be in error.

C₃₀H₃₀

1,2,5,6-Dibenzo-9,10-di-*n*-butylanthracene



M. P., °C
143.5-144.5^{12, 13}

*References on Dibenzanthracenes,
Dibenzophenanthrenes, and Their
Alkyl Derivatives*

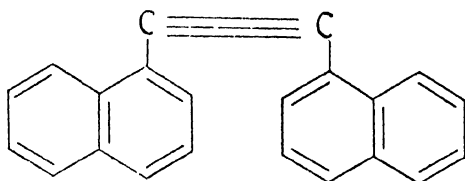
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3. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-30}



Di-(1'-naphthyl)-ethyne



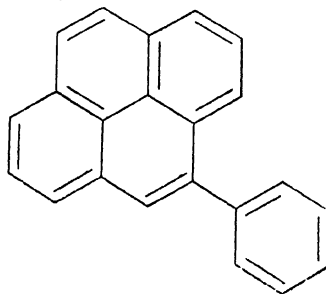
M. P., °C
225²⁵
171^{33, 34}

x-Phenylbenzo-[jk]-fluorene (a)

M. P., °C
144⁴⁸

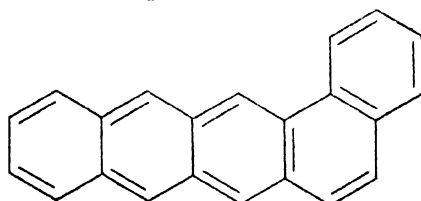
(a) The structure of this compound was not clearly defined in the literature.

4-Phenylpyrene

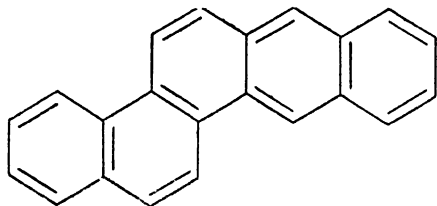


M. P., °C
169⁴⁷

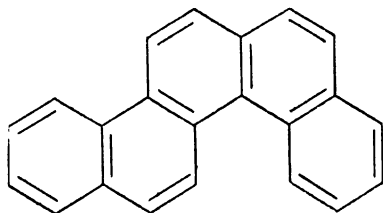
1,2-Benzonaphthacene



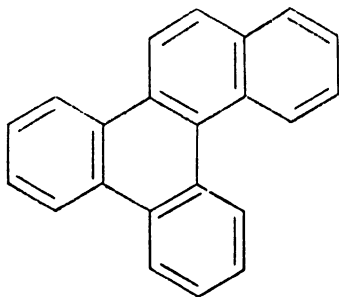
M. P., °C

263–264^{3, 12, 15, 16}**2,3-Benzochrysene**

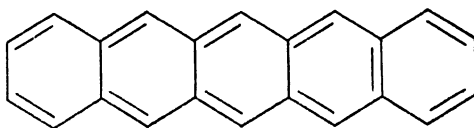
M. P., °C

293–294^{12, 16}293¹⁴**3,4-Benzochrysene**

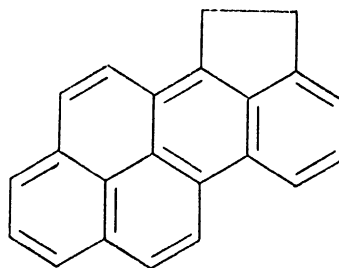
M. P., °C

128^{4, 50}126–127²⁸122⁴⁹**5,6-Benzochrysene**

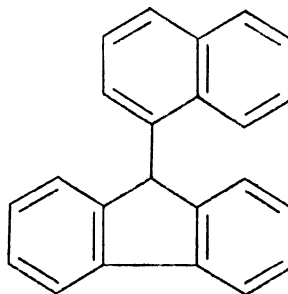
M. P., °C

115–116⁹114.5–115^{26, 27}**Pentacene**

M. P., °C

270–271^{38, 39}**Benzo-[hij]-cholanthrene**

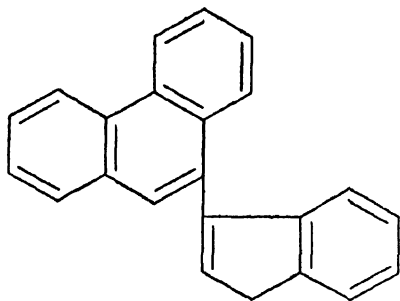
M. P., °C

255–256²252–253^{36, 37} $C_{23}H_{16}$ **9-(1'-Naphthyl)-fluorene**

M. P., °C

113³¹109–110⁴⁶103.5⁴⁵

9-(3'-Indenyl)-phenanthrene



M. P., °C

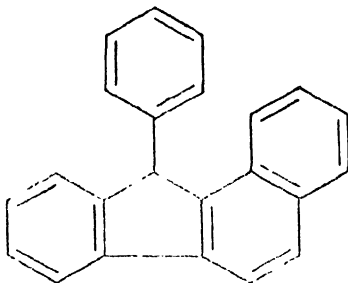
121.5⁵

B. P., °C @ 760mm

230

0.7⁵

1,2-Benzo-9-phenylfluorene



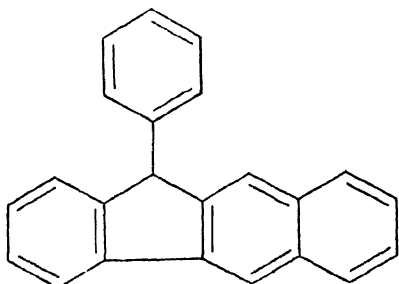
M. P., °C

196^{13, 31}195.5⁴⁴195⁶194¹⁷ D_4^{20}

1.242

0°⁵³

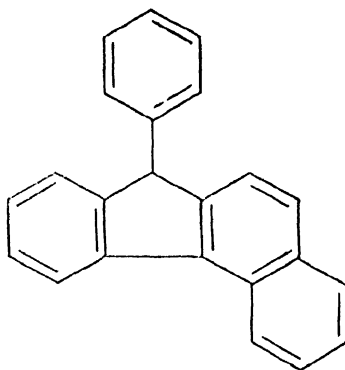
2,3-Benzo-9-phenylfluorene



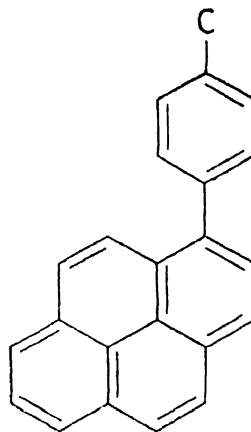
M. P., °C

137^{24, 44}

3,4-Benzo-9-phenylfluorene



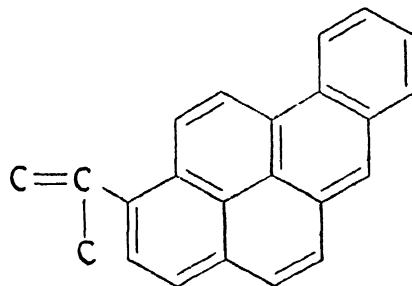
M. P., °C

135-138¹³1-*p*-Tolylpyrene

M. P., °C

155-156⁴¹

1,2-Benzo-8-isopropenylpyrene



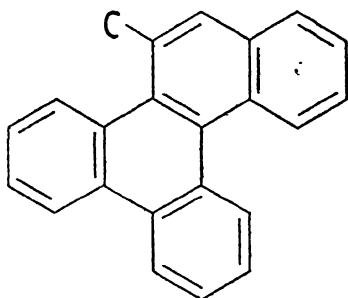
C₂₃H₁₆

382

M. P., °C

114–115⁵¹

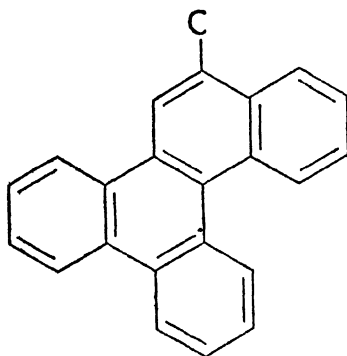
5,6-Benzo-11-methylchrysene



M. P., °C

163.5–164¹⁰

5,6-Benzo-12-methylchrysene

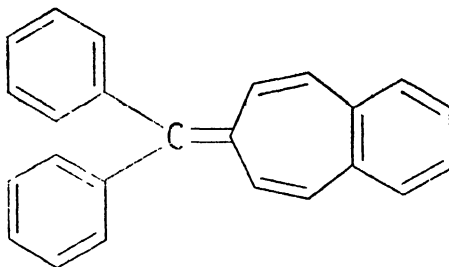


M. P., °C

150.5–151.5¹⁰

C₂₄H₁₈

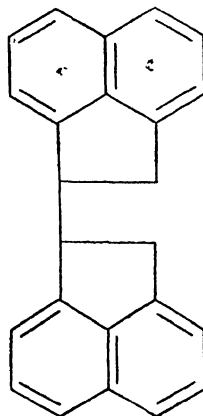
1,2-Benzo-5-benzhydrydenecycloheptadiene-3,6



M. P., °C

92⁴³

1,1'-Biacenaphthenyl



M. P., °C

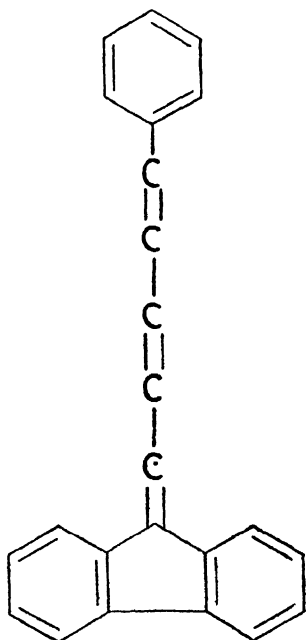
120^{18, 19, 21}

x, x'-Biacenaphthenyl (a)

M. P., °C

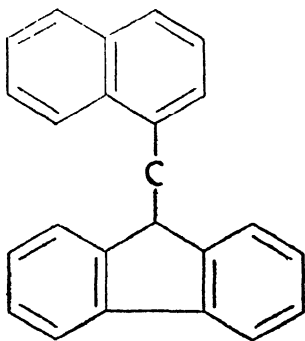
174²³

(a) The structure of this compound was not clearly defined in the literature.

1-Phenyl-5-(9'-fluorylidene)-penta-
diene-1,3

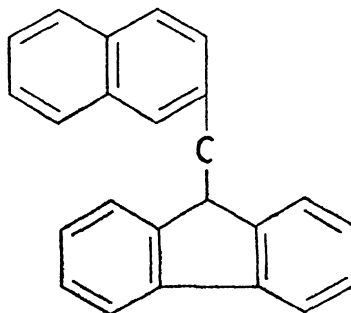
M. P., °C
155.5³²

(1-Naphthyl)-(9'-fluoryl)-methane

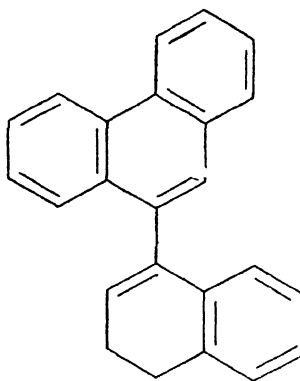


M. P., °C
135⁴⁰
133-134⁴²

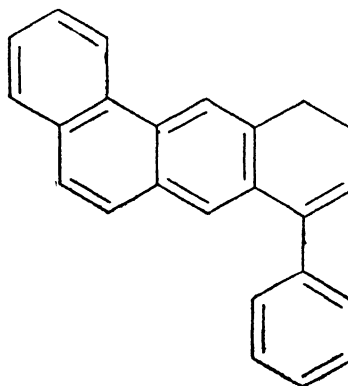
(2-Naphthyl)-(9'-fluoryl)-methane



M. P., °C
164⁴²

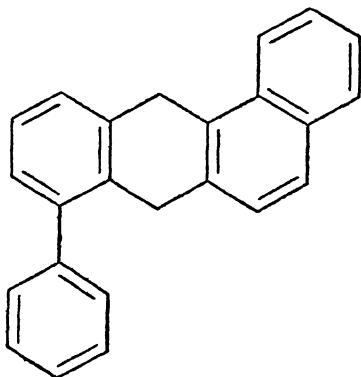
9-[4'-(1',2'-Dihydronaphthyl)]-
phenanthrene

M. P., °C
181.5⁵

7,8-Benzo-5-phenyl-1,2-dihydro-
anthracene

M. P., °C
125–126¹

1, 2-Benzo-5-phenyl-9, 10-dihydro-anthracene



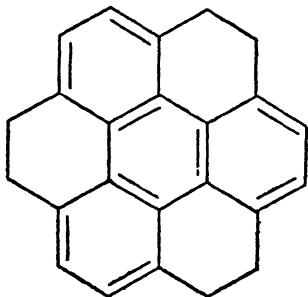
M. P., °C
96–96.5³

Crackene (a)

M. P., °C
309–310⁷
308^{29, 30}

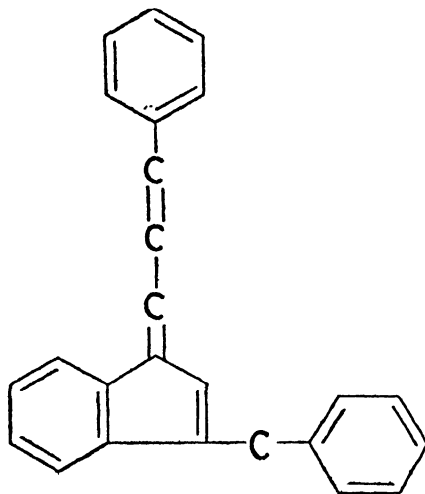
(a) The structure of this compound was not clearly defined in the literature. It may be a dimethyl picene or a dinaphthylbutene.

1, 2, 5, 6, 9, 10-Hexahydrocoronene



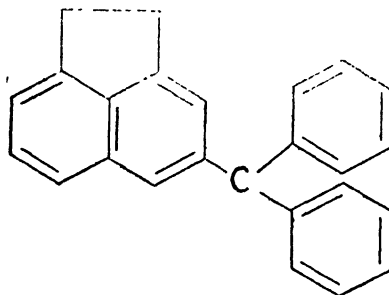
M. P., °C
271–272²²

1-Phenyl-3-(3'-benzylindenylidene)-propene-1

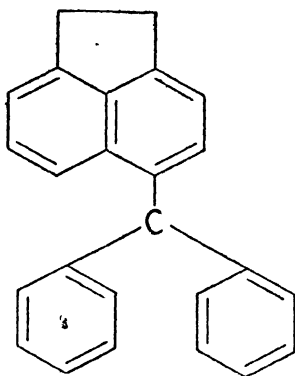


M. P., °C
161–162⁵²

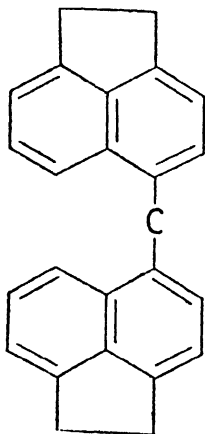
4-Benzhydrylacenaphthene



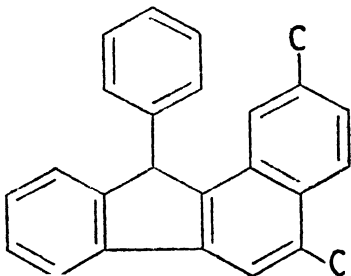
M. P., °C
176³⁵

5-Benzhydrylacenaphthene

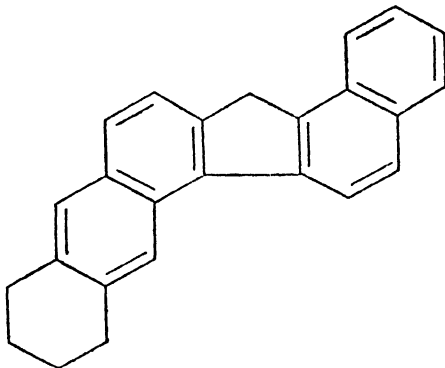
M. P., °C
167⁸

Di-5,5'-acenaphthylmethane

M. P., °C
140–141²⁰

1,2-(4'-Methylbenzo)-3-methyl-9-phenylfluorene

M. P., °C
215¹⁷

1,2-Benzo-5,6-[3',2'-(5',6',7',8'-tetrahydronaphtho)]-fluorene

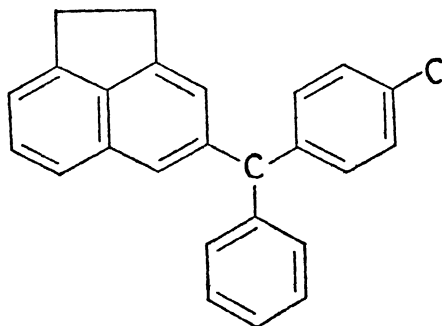
M. P., °C
160¹¹

B. P., °C @ 760mm
330

2¹¹ $C_{26}H_{22}$ **x-Benzhydrylidene-x, x-dimethyl-x, x-benzocycloheptadiene-x, x (a)**

M. P., °C
128.5–129⁴³

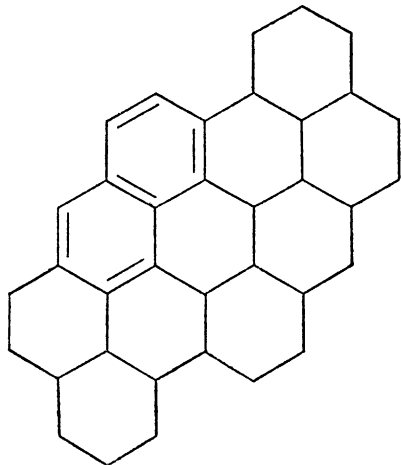
(a) The structure of this compound was not clearly defined in the literature.

Phenyl-*p*-tolyl-(4-acenaphthyl)-methane

M. P., °C
209³⁵

C₃₆H₄₂

Didecahydronaphtho-[3', 4', 5'-abc, 3'', 4'', 5''-jkl]-1, 2, 2a, 3, 4, 4a, 5, 6, 6a, 7, 8, 12c, 12d, 12e-tetra-decahydrocoronene



M. P., °C
262-263²²

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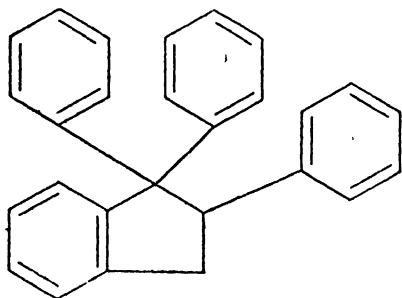
XIV. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-32}

1. Indane with Three Phenyl Substitutions
2. Fluorene with Two Phenyl Substitutions
3. Dihydroanthracenes and Dihydrophenanthrenes with Two Phenyl Substitutions
4. Miscellaneous Polynuclear Aromatics of Empirical Formula C_nH_{2n-32}

1. INDANE WITH THREE PHENYL SUBSTITUTIONS, $C_{27}H_{22}$

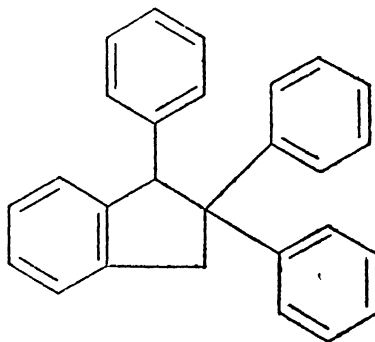
$C_{27}H_{22}$

1, 1, 2-Triphenylindane



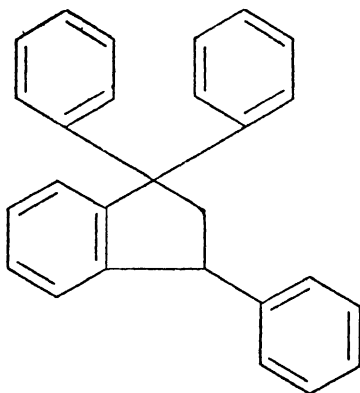
M. P., °C
83⁷

1, 2, 2-Triphenylindane



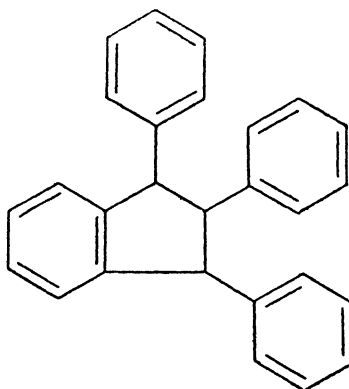
M. P., °C
140⁷

1, 1, 3-Triphenylindane



M. P., °C
112^{2, 7}
111-112⁷

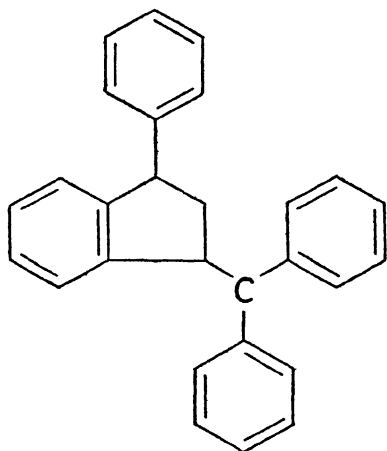
1, 2, 3-Triphenylindane



M. P., °C
154⁶
153⁷

C₂₈H₂₄

1-Phenyl-3-benzhydrylindane



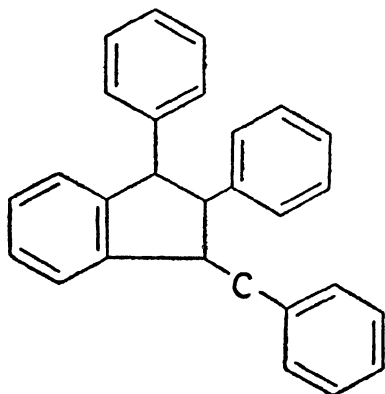
M. P., °C

137⁷135 (a)¹⁰133-135⁵133⁹131⁷107 (b)¹⁰

(a) This constant was determined on the stable form of the compound.

(b) This constant was determined on the labile form of the compound.

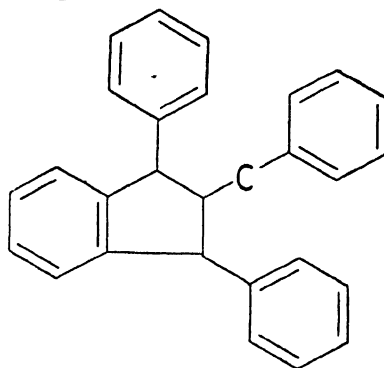
1,2-Diphenyl-3-benzylindane



M. P., °C

115^{1,4}

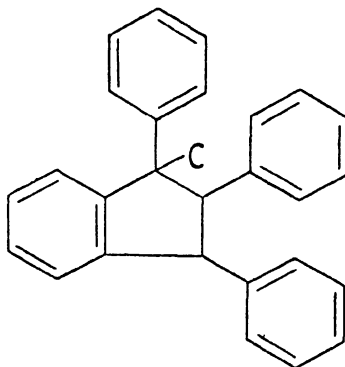
1,3-Diphenyl-2-benzylindane



M. P., °C

121-122.5⁴

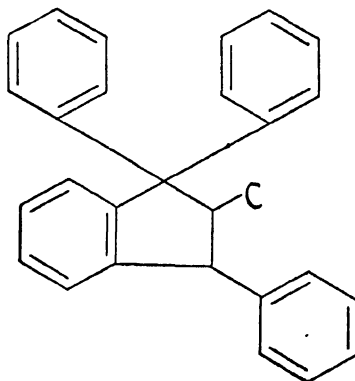
1-Methyl-1,2,3-triphenylindane



M. P., °C

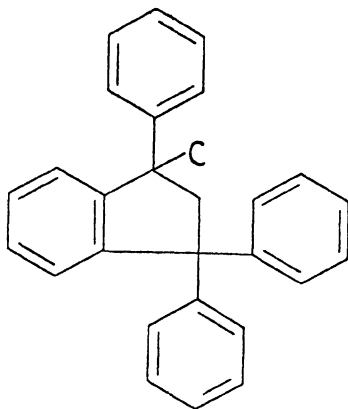
163-165³163-164⁴

1,1,3-Triphenyl-2-methylindane



M. P., °C
165⁴

1-Methyl-1,3,3-triphenylindane

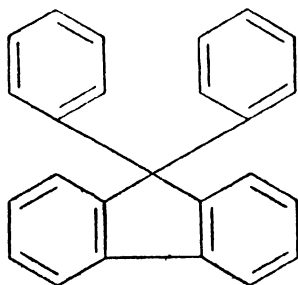


M. P., °C
143^{2, 8}

2. FLUORENE WITH TWO PHENYL SUBSTITUTIONS, C_nH_{2n-32}

$C_{25}H_{18}$

9,9-Diphenylfluorene



M. P., °C
222-223¹⁶
222¹⁸
219-220¹

D_4^{20}

1.220

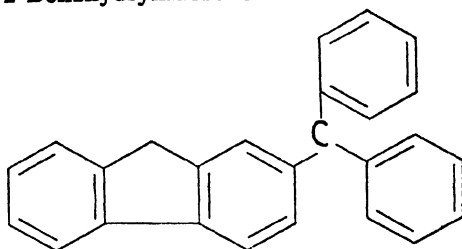
0°¹⁹

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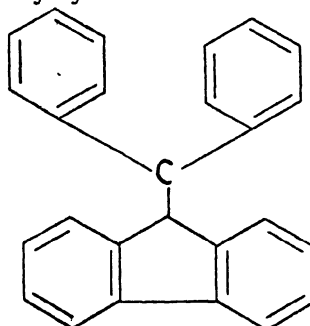
$C_{26}H_{20}$

2-Benzhydrylfluorene



M. P., °C
147-148²

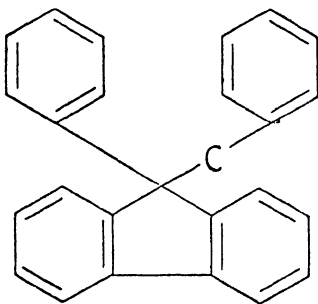
9-Benzhydrylfluorene



M. P., °C

217–218^{7, 20}217^{9, 10, 12}216–217³187–189 (a)³187 (a)¹²

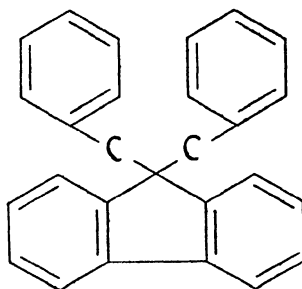
(a) This constant was determined on an isomeric form of the compound.

9-Phenyl-9-benzylfluorene

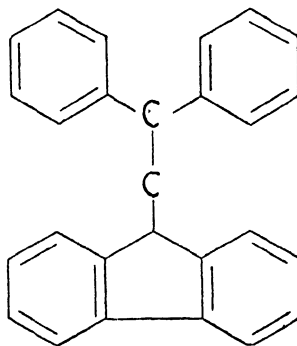
M. P., °C

139^{11, 14}136–137⁸136–136.5¹⁵136⁶125–126 (a)¹⁴

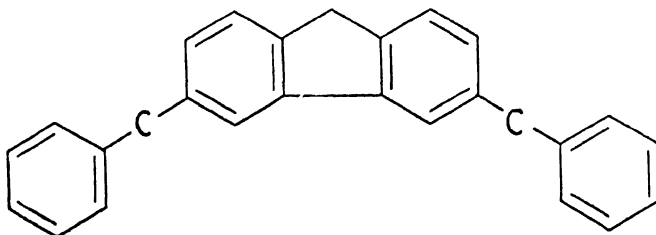
(a) This constant was determined on an isomeric form of the compound.

9,9-Dibenzylfluorene

M. P., °C

150–151¹³147–148¹⁷**1,1-Diphenyl-2-(9'-fluoryl)-ethane**

M. P., °C

107¹²**3,6-Dibenzylfluorene**

M. P., °C

125^{4, 5}

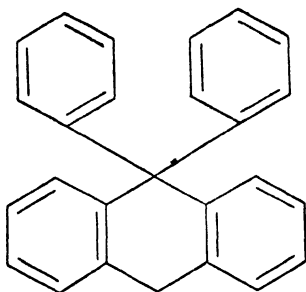
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3. DIHYDROANTHRACENES AND DIHYDROPHENANTHIRENES WITH TWO PHENYL SUBSTITUTIONS, $C_{26}H_{20}$



9,9-Diphenyl-9,10-dihydroanthracene



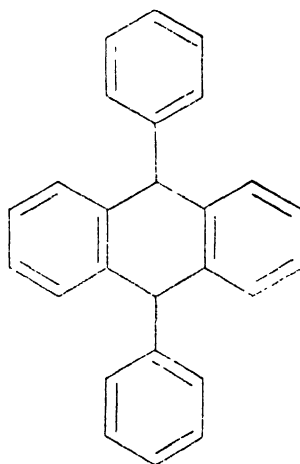
M. P. °C

200¹

195-196¹⁰

194-195^{2, 4}

9,10-Diphenyl-9,10-dihydroanthracene



M. P., °C

227-228 (a)⁷

208⁵

198.5-199.5 (a)⁷

199 (b)¹³

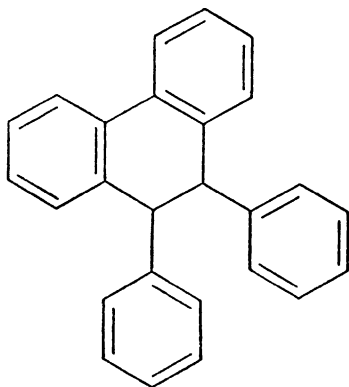
190 (b)¹³

164.2^{8, 11}159¹²

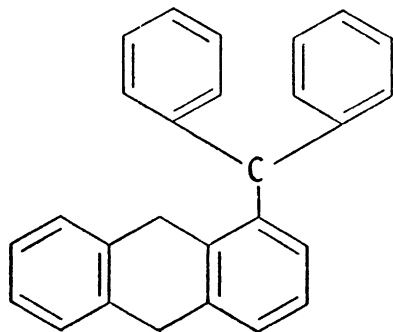
B. P., °C @ 760mm

437¹¹

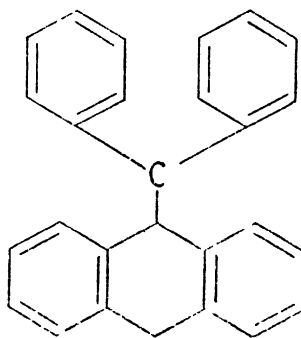
- (a) These constants were determined on isomeric forms.
(b) These constants were determined on different crystalline forms.

9, 10-Diphenyl-9, 10-dihydrophenanthrene

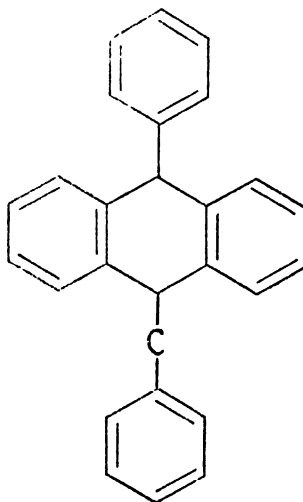
M. P., °C

130-131¹³ $C_{27}H_{22}$ **1-Benzhydryl-9, 10-dihydroanthracene**

M. P., °C

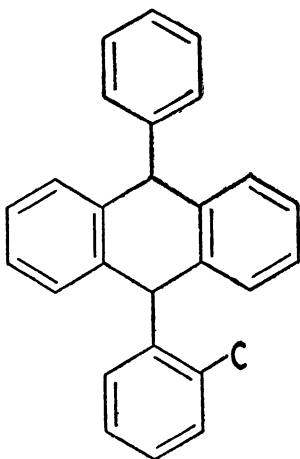
131-132¹⁴**9-Benzhydryl-9, 10-dihydroanthracene**

M. P., °C

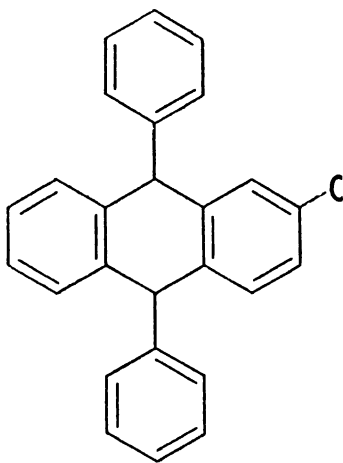
207.5¹³**9-Phenyl-10-benzyl-9, 10-dihydroanthracene**

M. P., °C

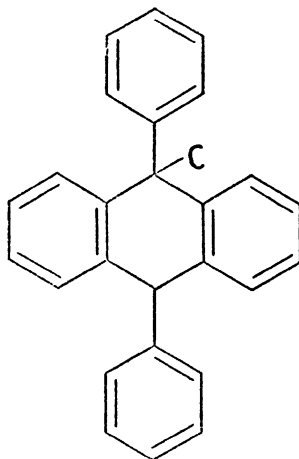
119¹³

9-Phenyl-10-*o*-tolyl-9,10-dihydroanthracene

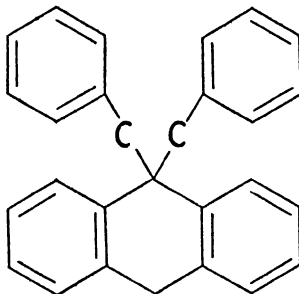
M. P., °C
186–187⁷

2-Methyl-9,10-diphenyl-9,10-dihydroanthracene

M. P., °C
179⁶

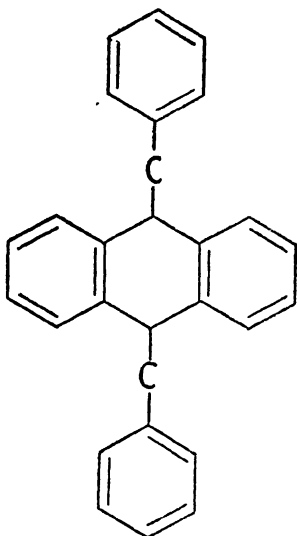
9-Methyl-9,10-diphenyl-9,10-dihydroanthracene

M. P., °C
171¹³

 $C_{28}H_{24}$ **9,9-Dibenzyl-9,10-dihydroanthracene**

M. P., °C
178³
115⁹

9,10-Dibenzyl-9,10-dihydroanthracene



M. P., °C
118³

x, x-Dimethyl-9, 10-diphenyl-9, 10-dihydroanthracene (a)

M. P., °C
185¹²

(a) The structure of this compound was not clearly defined in the literature.

C₃₀H₂₃

x, x-Dimethyl-9, 10-dibenzyl-9, 10-dihydroanthracene (a)

M. P., °C
215¹²

(a) The structure of this compound was not clearly defined in the literature.

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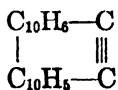
4. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-32}

C₂₂H₁₂

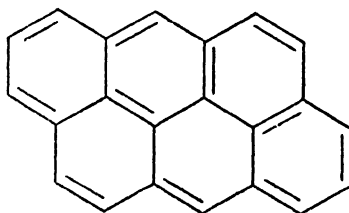
Dinaphthylanthrylene (a)

M. P., °C
270²³

(a) This name was given in the literature with the formula:



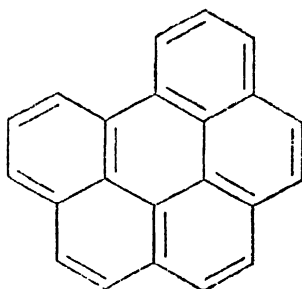
Dibenzo-[cd, jk]-pyrene
(Anthranthrene)



M. P., °C

261^{8, 9}258¹⁴257²⁹

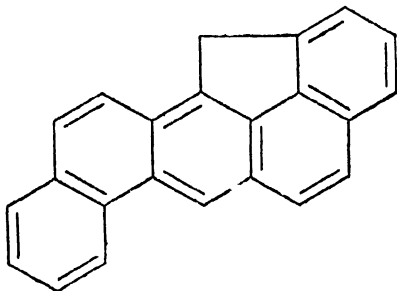
Benzo-[ghi]-perylene



M. P., °C

278-281¹²277-278.5¹²273^{5, 7}272³⁵ $C_{23}H_{14}$

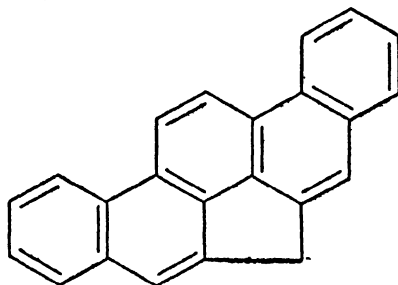
Benzo-[bc]-cholanthrene



M. P., °C

266-267²¹

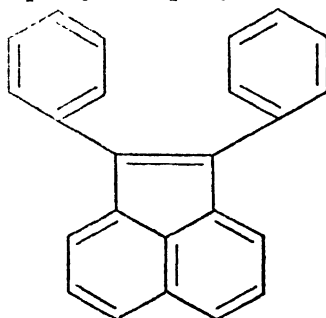
Cyclopentano-[ghi]-picene



M. P., °C

277³¹ $C_{24}H_{16}$

1,2-Diphenylacenaphthylene

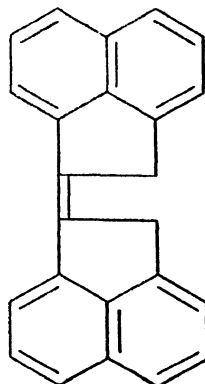


M. P., °C

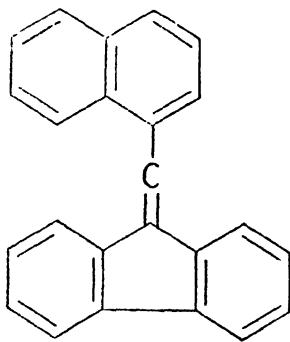
164.5-166²⁴161-162³²161.3²159.5-161³³

1,1'-Biacenaphthylidene

(Biacene)



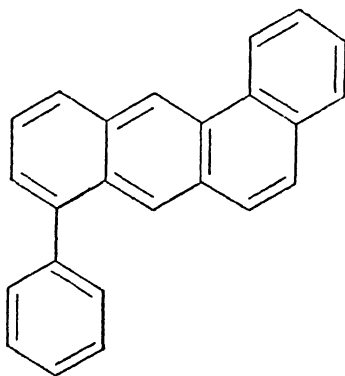
M. P., °C

277^{15, 16}275-276¹⁷271-273¹⁸(1-Naphthyl)-(9'-fluorylidene)-
methane

M. P., °C

149-150²⁸

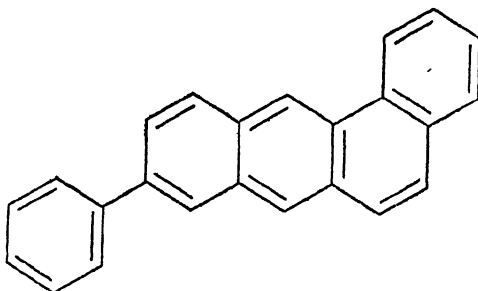
1,2-Benzo-5-phenylanthracene



M. P., °C

151-152¹

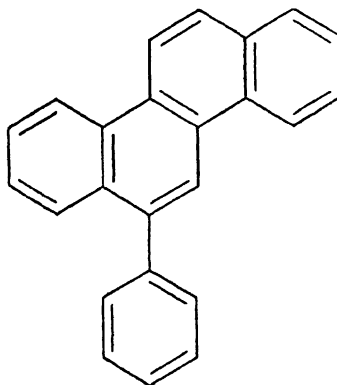
1,2-Benzo-6-phenylanthracene



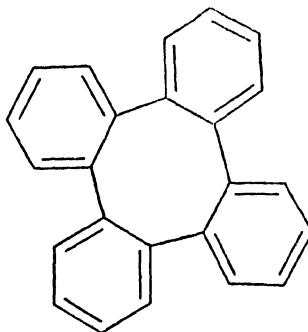
M. P., °C

240-241¹⁰

6-Phenylchrysene



M. P., °C

192-192.5³⁰1,2,3,4,5,6,7,8-Tetrabenzocyclo-
octane
(Tetraphenylene)

M. P., °C

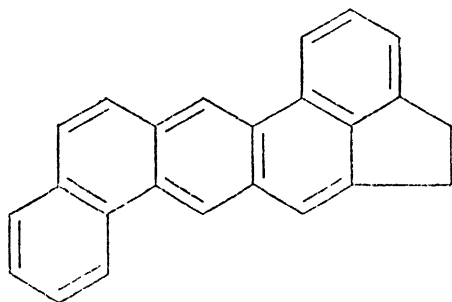
233²⁶

Tetraphenylene (a)

M. P., °C

304-305⁶

- (a) The structure of this compound was not clearly defined in the literature.

Indo-[3,4-ab]-benzo-[h]-anthracene

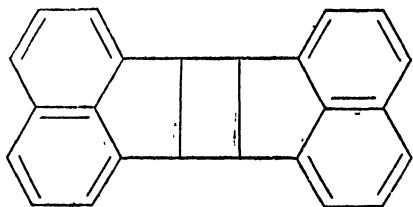
M. P., °C

231 233¹¹**x,x-Dihydro-x,x-dibenzopyrene (a)**

M. P., °C

313.5-314.5³¹

- (a) The structure of this compound was not clearly defined in the literature.

**1,2,3,4-Di-(2',1'-acenaphtheno)-
cyclobutane**
(α -Heptacyclene)


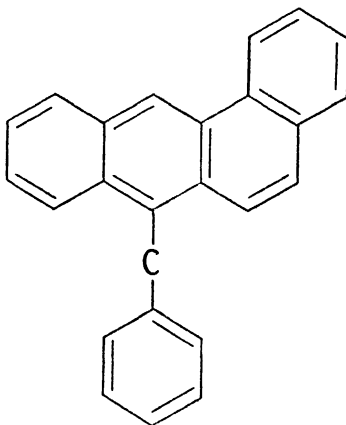
M. P., °C

306-307^{19, 20} **β -Heptacyclene (a)**

M. P., °C

234²⁰232-234¹⁹

- (a) The structure of this compound was not clearly defined in the literature.

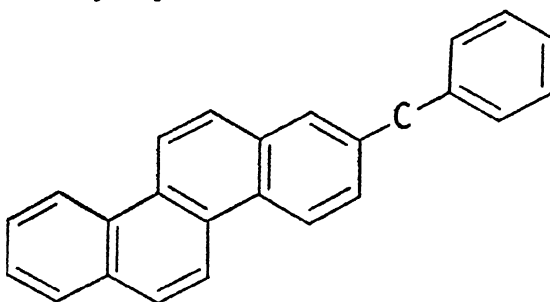
 $C_{25}H_{18}$ **1,2-Benzo-10-benzylanthracene**

M. P., °C

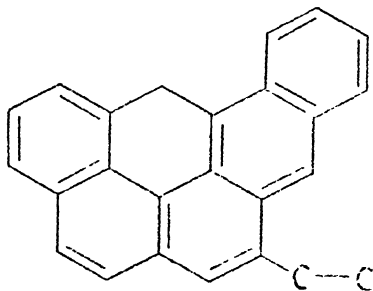
195-196¹⁰

This series continued on next page

2-Benzylchrysene

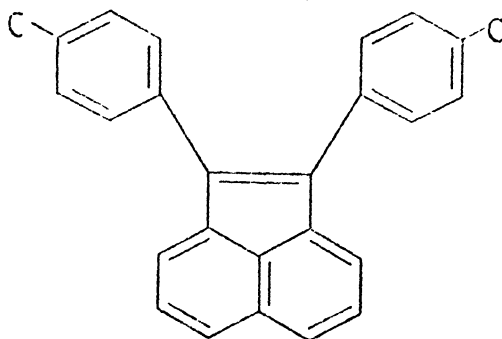


M. P., °C
200²²

Dibenzo-[a, jk]-4-ethyl-10-hydro-
pyrene (a)

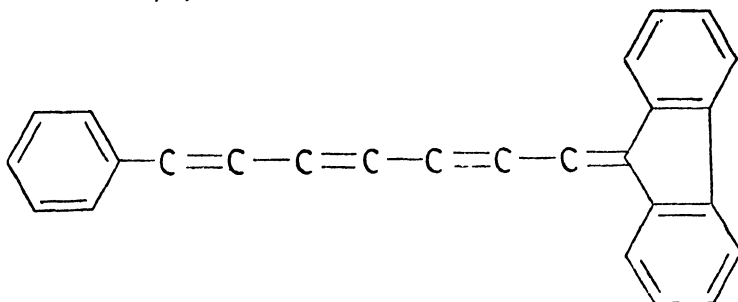
M. P., °C
116.5-117.5¹³

(a) The structure of this compound
was not clearly defined in the
literature.

 $C_{26}H_{20}$ 1,2-Di-*p*-tolylacenaphthylene

M. P., °C

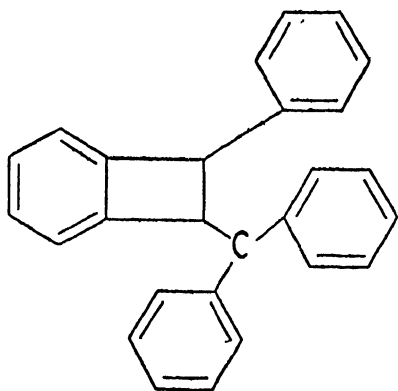
**1-Phenyl-7-(9'-fluorylidene)-hepta-
triene-1,3,5**



M. P., °C
166²⁵

 $C_{27}H_{22}$

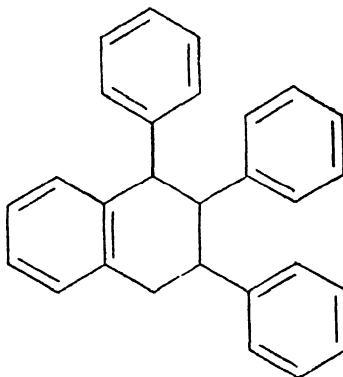
**1-Phenyl-2-benzhydryl-3,4-benzo-
cyclobutane**



M. P., °C
184²⁷

 $C_{28}H_{24}$

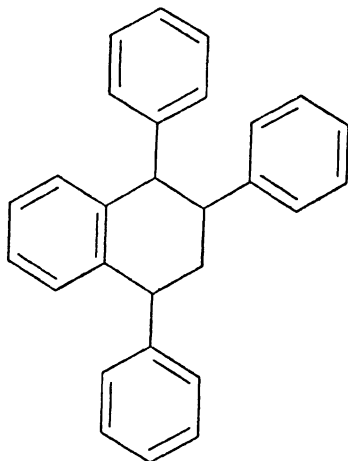
**1,2,3-Triphenyl-1,2,3,4-tetrahydro-
naphthalene**



M. P., °C
136-137³

This series continued on next page

1,2,4-Triphenyl-1,2,3,4-tetrahydronaphthalene



M. P., °C
127⁴

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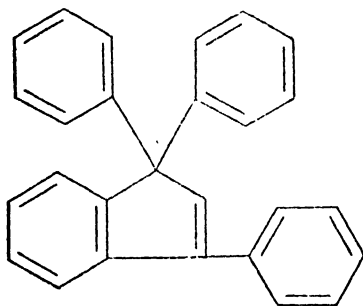
XV. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-34}

1. Indene with Three Phenyl Substitutions
2. Anthracene or Phenanthrene with Two Phenyl Substitutions
3. Miscellaneous Polynuclear Aromatics of Empirical Formula C_nH_{2n-34}

1. INDENE WITH THREE PHENYL SUBSTITUTIONS, C_nH_{2n-4}

$C_{27}H_{20}$

1,1,3-Triphenylindene



M. P., °C

135^{12, 16}

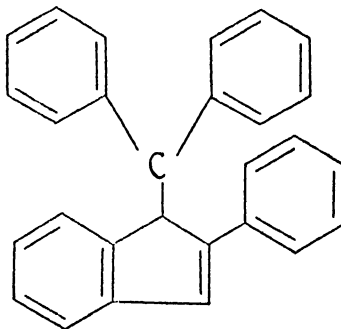
134-135¹⁵

132-134^{2, 9}

133¹⁷

$C_{28}H_{22}$

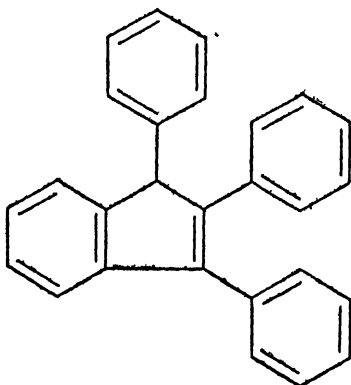
1-Benzhydryl-2-phenylindene



M. P., °C

175⁴

1,2,3-Triphenylindene



M. P., °C

135^{12, 13, 17}

132-134⁶

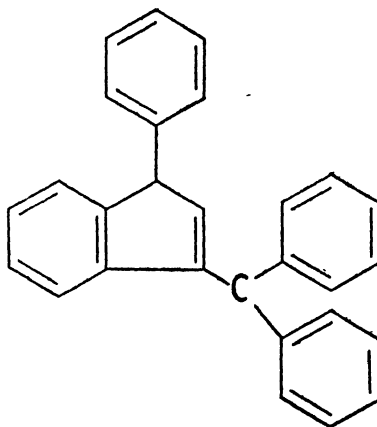
130-132⁹

D_4^{20}

1.176

0°¹⁸

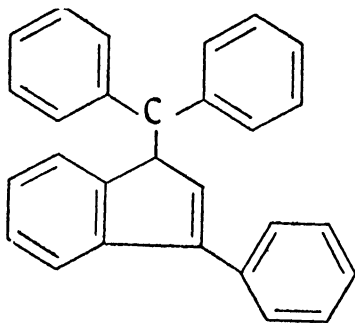
1-Phenyl-3-benzhydrylindene



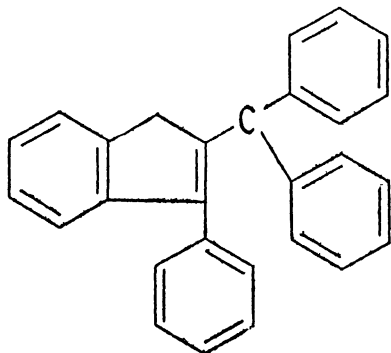
M. P., °C

131¹⁵

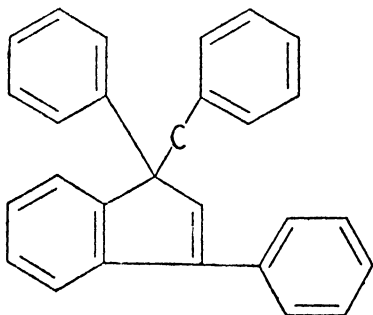
124-125⁴

1-Benzhydryl-3-phenylindene

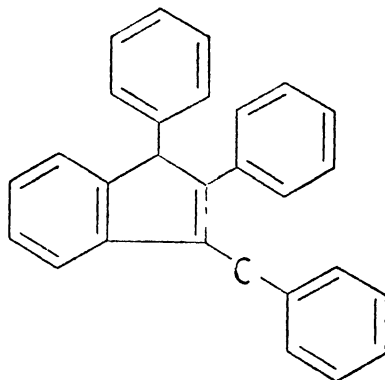
M. P., °C
174.5–175⁴
171¹⁵

2-Benzhydryl-3-phenylindene

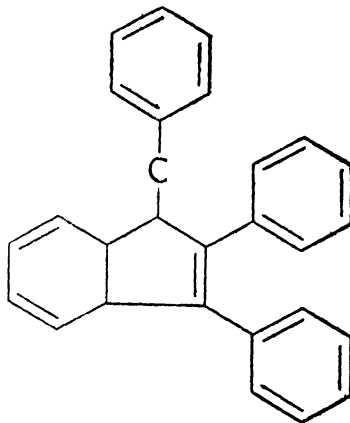
M. P., °C
162–163.5¹⁰

1-Benzyl-1,3-diphenylindene

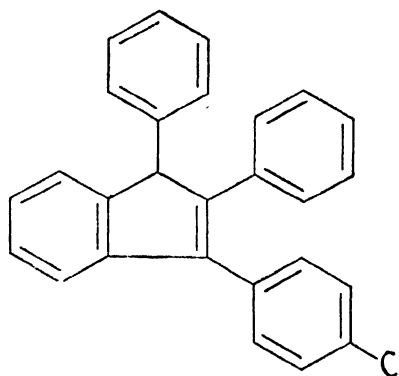
M. P., °C
100–102⁸

1,2-Diphenyl-3-benzylindene

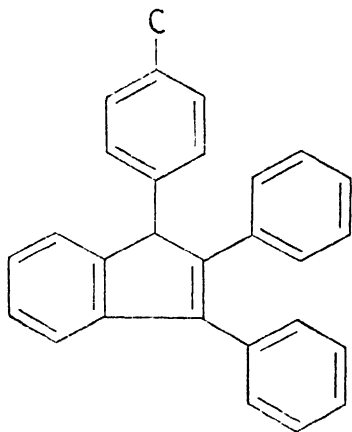
M. P., °C
143–144¹
118.5–119.5⁵

1-Benzyl-2,3-diphenylindene

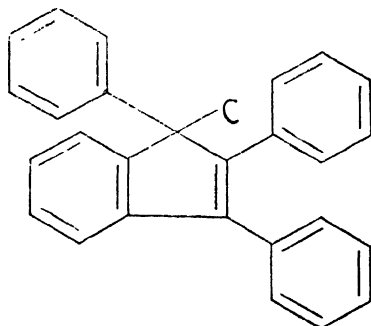
M. P., °C
118.5–120⁵

1,2-Diphenyl-3-*p*-tolylindene

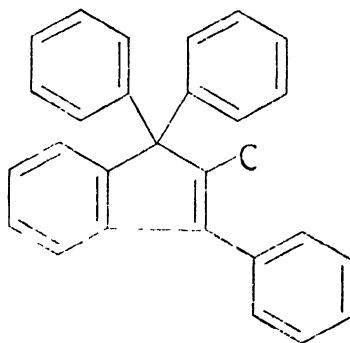
M. P., °C
116–117⁷

1-*p*-Tolyl-2,3-diphenylindene

M. P., °C
154–156⁷

1-Methyl-1,2,3-triphenylindene

M. P., °C
96–98¹¹

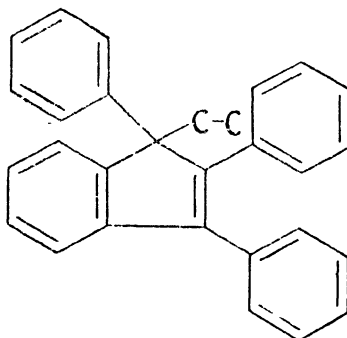
1,1,3-Triphenyl-2-methylindene

M. P., °C
157–159.5¹¹
150³

***x*-Methyl-*x,x,x*-triphenylindene (a)**

M. P., °C
118¹⁴

(a) The structure of this compound was not clearly defined in the literature.

**1-Ethyl-1,2,3-triphenylindene**

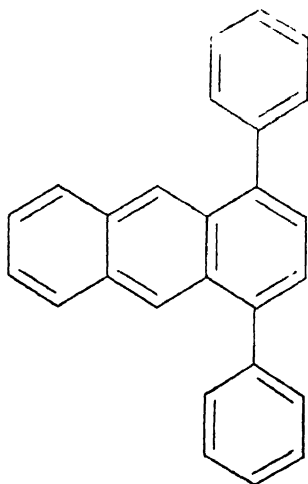
M. P., °C
108¹²

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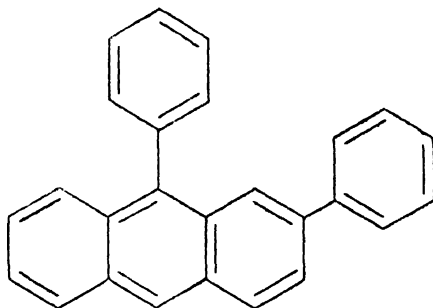
2. ANTHRACENE OR PHENANTHRENE WITH TWO PHENYL SUBSTITUTIONS, $C_{26}H_{20}$

$C_{26}H_{20}$
1,4-Diphenylanthracene



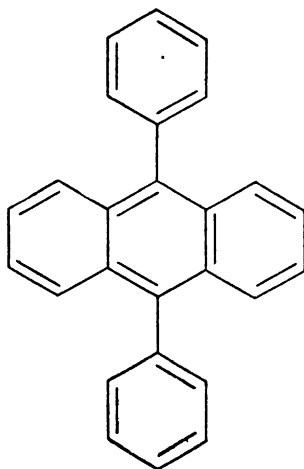
M. P., °C
170³⁹

2,9-Diphenylanthracene



M. P., °C
165-166²⁵

This series continued on next page.

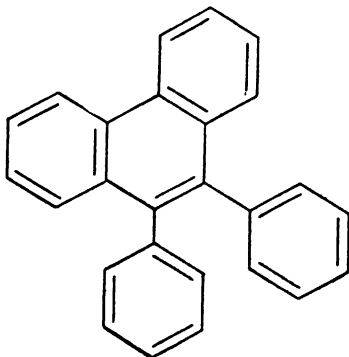
9,10-Diphenylanthracene

M. P., °C

247

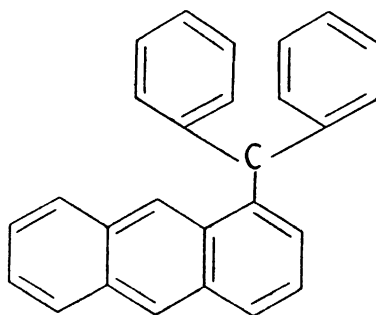
250–251¹⁹249–250^{23, 26}248¹⁷247–248^{16, 23}247^{25, 34}246³⁸245–246²⁹242–243²⁸241–243¹¹214 (a)³⁴

(a) This constant was determined on an isomeric form of the compound.

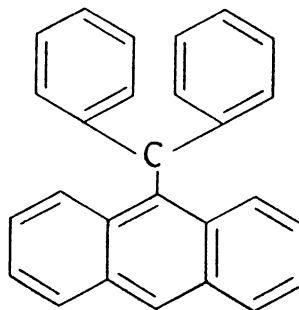
9,10-Diphenylphenanthrene

M. P., °C

236

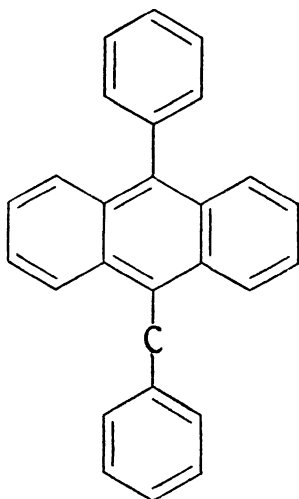
240³⁵237^{18, 30}235–235.5¹⁴235³⁶234^{12, 15}233–234⁴⁰ $C_{27}H_{20}$ **1-Benzhydrylanthracene**

M. P., °C

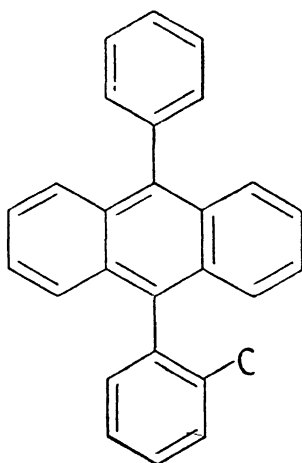
173–175³⁷**9-Benzhydrylphenanthrene**

M. P., °C

204–205⁴

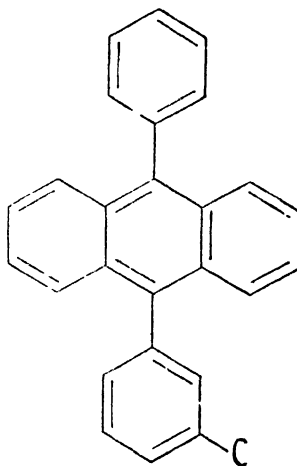
9-Phenyl-10-benzylanthracene

M. P., °C
 155⁷
 154²⁷
 151³⁴

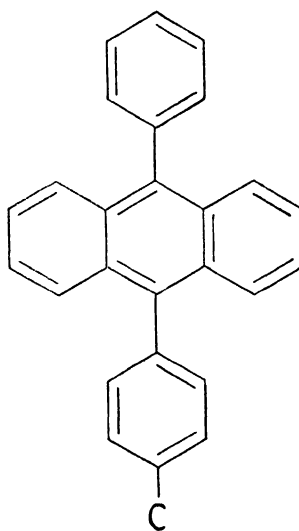
9-Phenyl-10-*o*-tolylanthracene

M. P., °C
 261–262²³
 257–258³⁴
 172–173 (a)³⁴

(a) This constant was determined on an isomeric form of the compound.

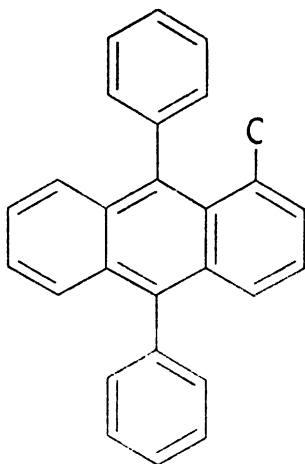
9-Phenyl-10-*m*-tolylanthracene

M. P., °C
 182–183³⁴

9-Phenyl-10-*p*-tolylanthracene

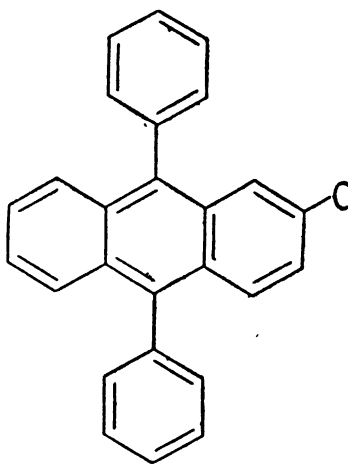
M. P., °C
 192²²

1-Methyl-9,10-diphenylanthracene



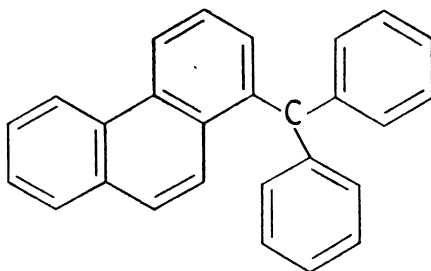
M. P., °C
194³⁴

2-Methyl-9,10-diphenylanthracene



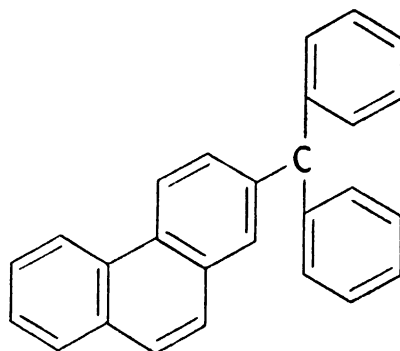
M. P., °C
242–243²⁰
214³⁴
213²¹

1-Benzhydrylphenanthrene



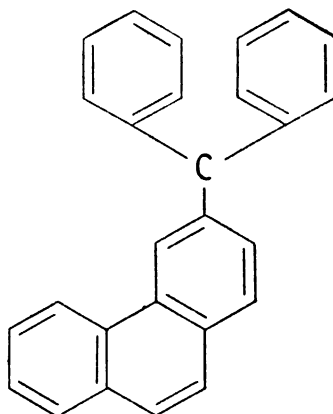
M. P., °C
175–176³

2-Benzhydrylphenanthrene

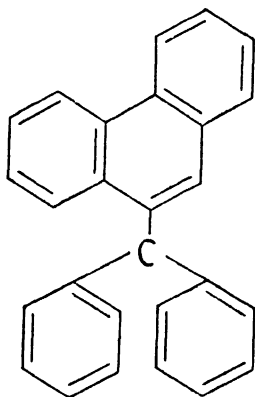


M. P., °C
151–152³

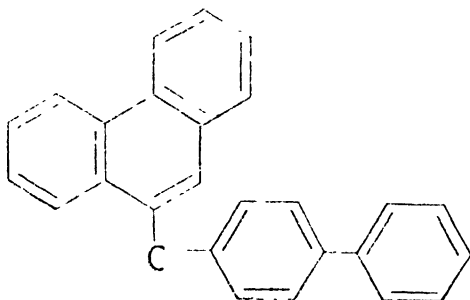
3-Benzhydrylphenanthrene



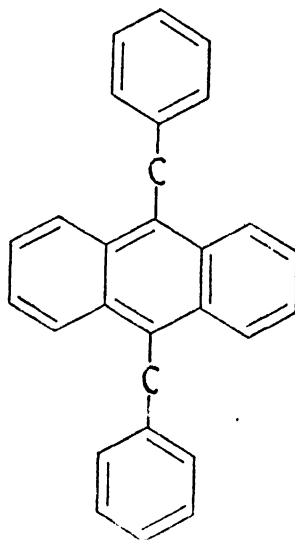
M. P., °C
122–123³

9-Benzhydrylphenanthrene

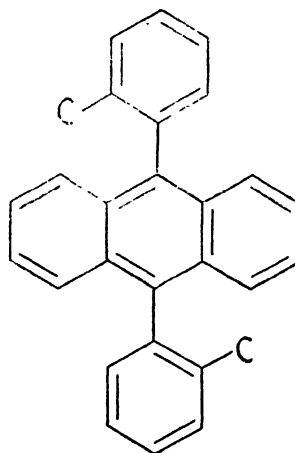
M. P., °C
 175-176¹
 174-175³

***p*-Biphenyl-9-phenanthrylmethane**

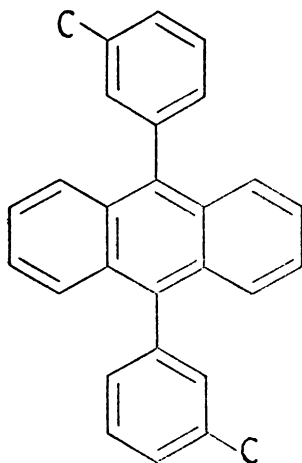
M. P., °C
 192-193³

 $C_{28}H_{22}$ **9,10-Dibenzylanthracene**

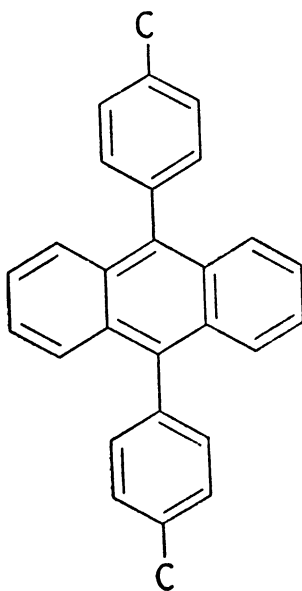
M. P., °C
 242
 245⁶
 243-245²
 211-242¹⁸
 211³¹
 210¹³
 239-240^{41, 32}

9,10-Di-*o*-tolylanthracene

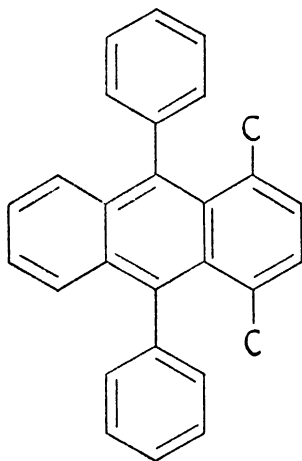
M. P., °C
 347-348⁴¹

9,10-Di-*m*-tolylantracene

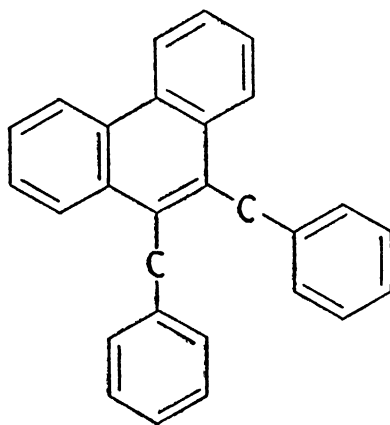
M. P., °C
222⁴¹

9,10-Di-*p*-tolylantracene

M. P., °C
279⁴¹
278–279²⁶

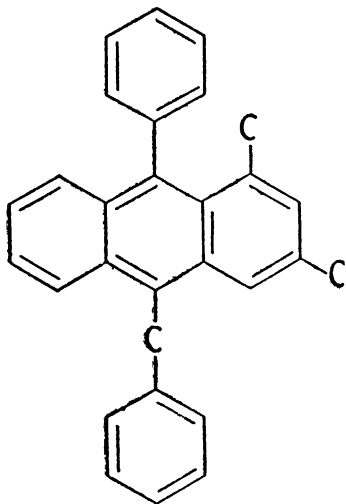
1,4-Dimethyl-9,10-diphenylantracene

M. P., °C
189⁹

9,10-Dibenzylphenanthrene

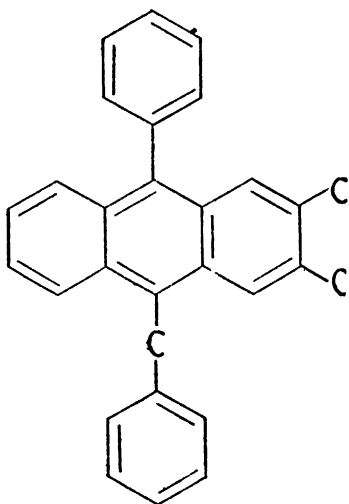
M. P., °C
180–182⁴²

$C_{29}H_{24}$
1,3-Dimethyl-9-phenyl-10-benzylanthracene



M. P., °C
137⁸

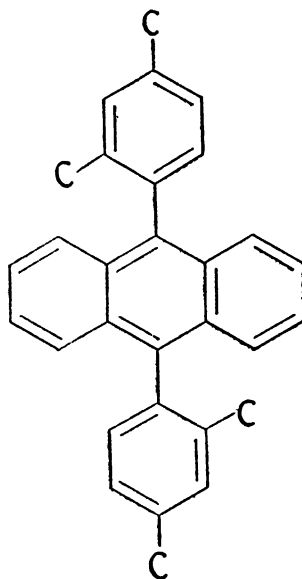
2,3-Dimethyl-9-phenyl-10-benzylanthracene



M. P., °C
163¹⁰

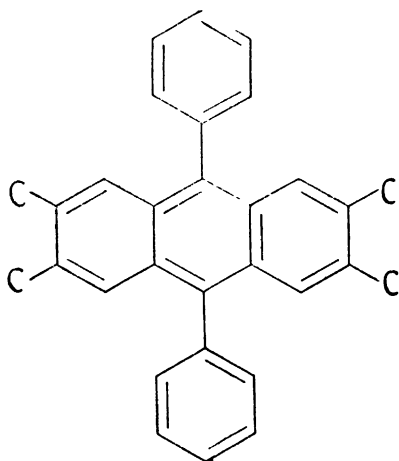
$C_{30}H_{26}$

9,10-Di-(2',4'-dimethylphenyl)anthracene



M. P., °C
290¹⁷

2,3,6,7-Tetramethyl-9,10-diphenylanthracene



M. P., °C
312⁵
284-285³³

1-Methyl-7-isopropyl-x, x-diphenyl-phenanthrene (a)

M. P., °C

200²⁴

- (a) The structure of this compound was not clearly defined in the literature.

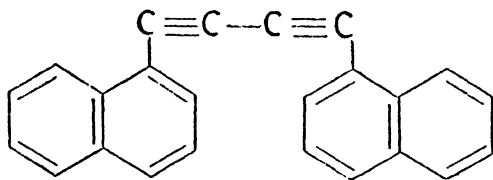
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3. MISCELLANEOUS POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-24}

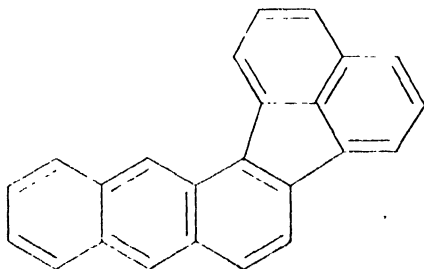
 $C_{24}H_{14}$

Di-(1-naphthyl)-butadiyne



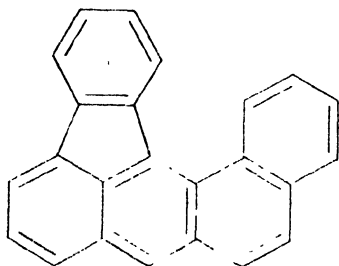
M. P., °C
171³³

1,2-(2',1'-Acenaphtho)-anthracene



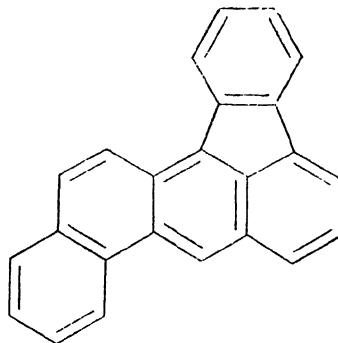
M. P., °C
290-291⁶³

Benzo-[a]-indo-[3,2,1-kl]-anthracene



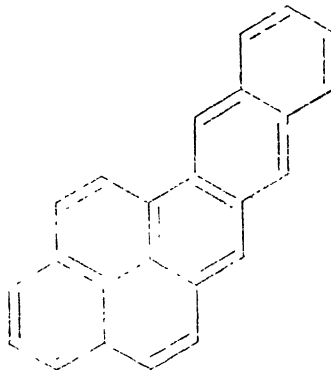
M. P., °C
178-179²⁹

1,2-Benzocholanthrylene

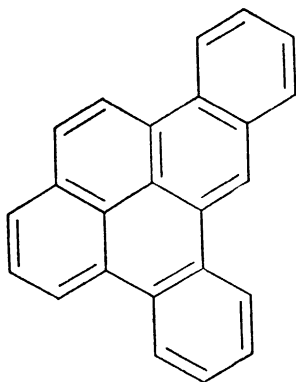


M. P., °C
181-181.3²⁹
180.2-180.6⁷⁶

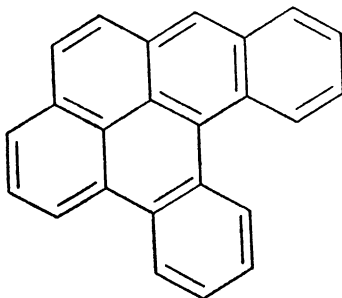
1,2-(3',2'-Naphtho)-pyrene



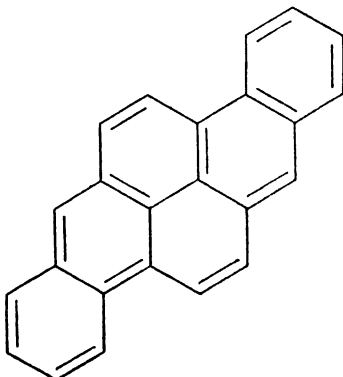
M. P., °C
273²⁵
265-266¹⁷

1,2,4,5-Dibenzopyrene

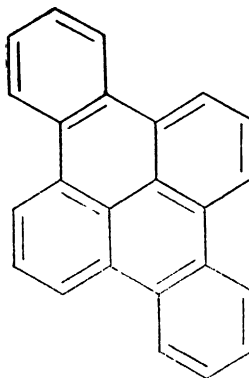
M. P., °C
238–239³¹
225²¹

2,3,4,5-Dibenzopyrene

M. P., °C
226–227¹⁶

1,2,6,7-Dibenzopyrene

M. P., °C
315⁶⁶
308¹⁸

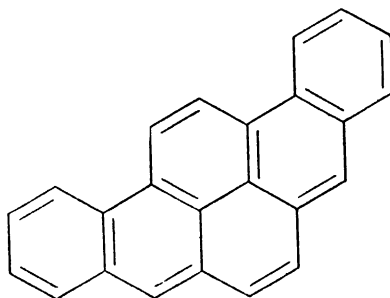
4,5,9,10-Dibenzopyrene

M. P., °C
353–355⁵⁴
340–342²¹

x,x'-Dibenzopyrene (a)

M. P., °C
320–320.5⁷⁷

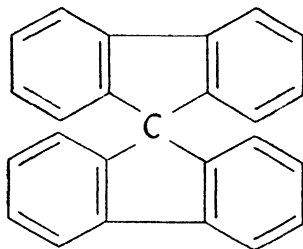
(a) The structure of this compound was not clearly defined in the literature.

Benzo-[ghi]-picene

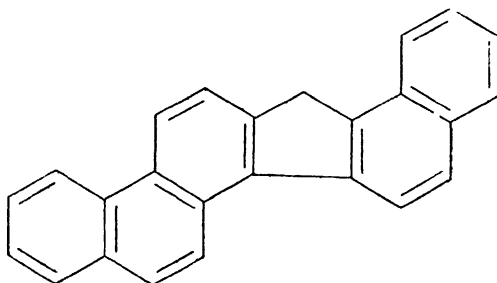
M. P., °C
281.5–282⁵⁸
280¹⁸

$C_{25}H_{16}$

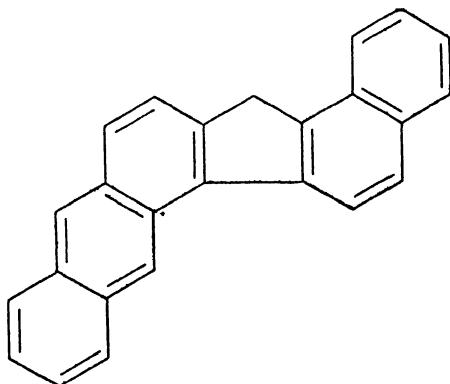
Spiro[fluorene-9,9'-fluorene]



M. P., °C

198–199²²1,2-Benzo-5,6-(2',1'-naphtho)-
fluorene

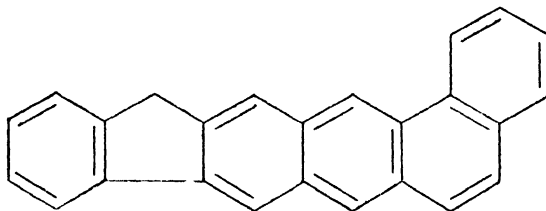
M. P., °C

286–287¹⁴1,2-Benzo-5,6-(3',2'-naphtho)-
fluorene

M. P., °C

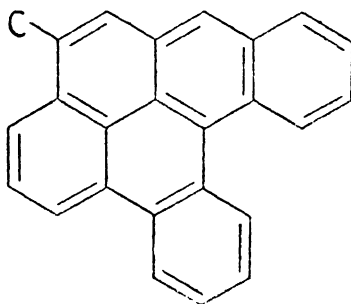
225¹⁴*This series continued on next page*

1,2-Benzo-6,7-(3',2'-indo)-anthracene



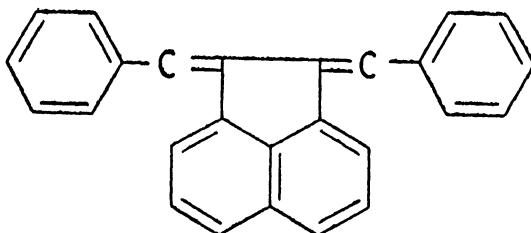
M. P., °C
302-304²⁴

9-Methyl-2,3,4,5-dibenzopyrene

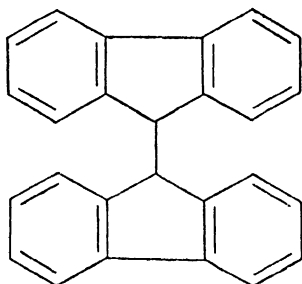


M. P., °C
225-226¹⁵

1,2-Dibenzylideneacenaphthene

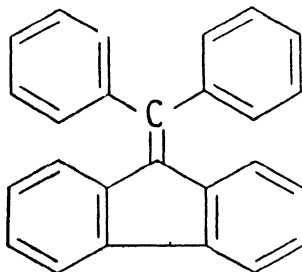


M. P., °C
142⁴⁶

9,9'-Bifluoryl

M. P., °C

246.5

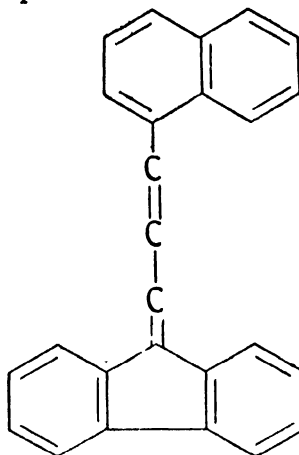
249⁴⁴246-247^{43, 69, 70}246^{6, 23, 30}215⁵¹241-245^{49, 74}242-244²⁵241^{47, 61}240^{39, 55, 59}**9-Benzhydrylidenefluorene**

M. P., °C

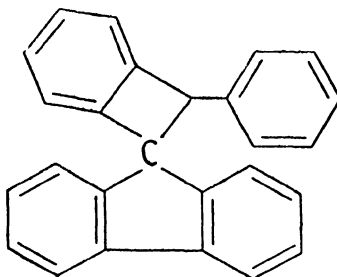
229

229.5^{37, 38, 40}229-229.5⁶³228⁶⁰225³²224-225⁵⁵223.5-224.5⁷⁶213 (a)⁵⁵

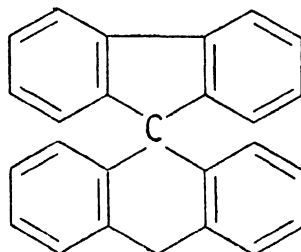
(a) This constant was determined on a stereoisomer of the compound.

1-(1'-Naphthyl)-3-(9''-fluorylidene)-propene-1

M. P., °C

174-175⁵⁶**Spiro[2-phenyl-3,4-benzocyclobutane-1,9'-fluorene]**

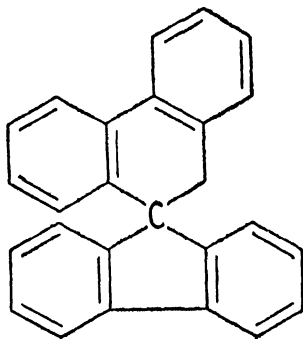
M. P., °C

235⁴¹**Spiro[9,10-dihydroanthracene-9,9'-fluorene]**

M. P., °C

207²²

Spiro[9,10-dihydrophenanthrene-9,9'-fluorene]

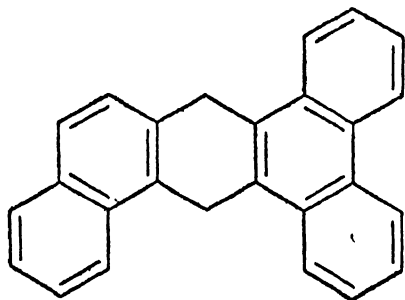


M. P., °C
195⁶²

x,x-Dihydrohexacene (a)

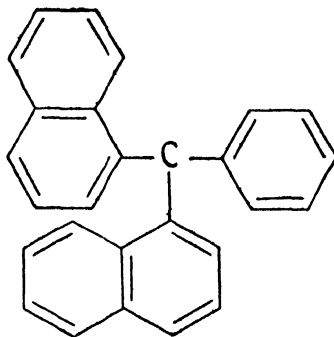
M. P., °C
369-370⁴⁵
357-358¹⁹

(a) The hydrogens are in either the 5, 16- or the 6, 15-positions.

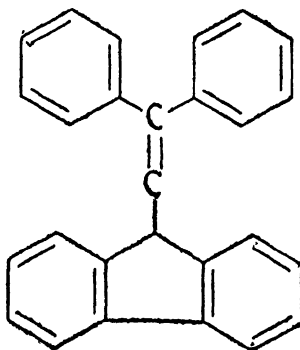
1,2,3,4,5,6-Tribenzo-9,10-dihydroanthracene

M. P., °C
281-283¹

Phenyldi-(1'-naphthyl)-methane



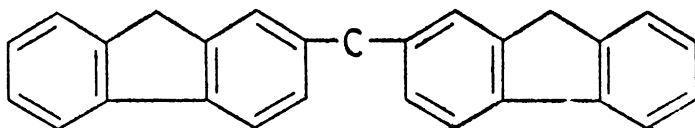
M. P., °C
288³⁶
204⁵⁷

9-Fluorylbenzhydrylidene methane

M. P., °C
111-112⁵⁵

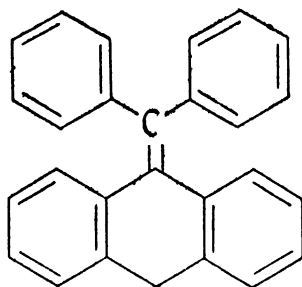
This series continued on next page

2,2'-Difluorylmethane



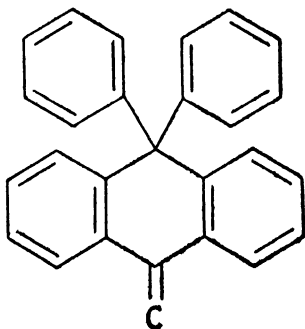
M. P., °C
201–202²⁷

9-Benzhydrylidene-9,10-dihydroanthracene



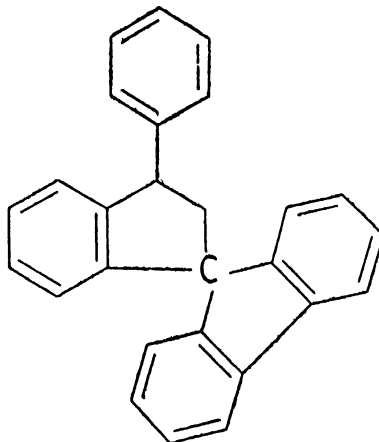
M. P., °C
256⁵⁰

9,9-Diphenyl-10-methylene-9,10-dihydroanthracene



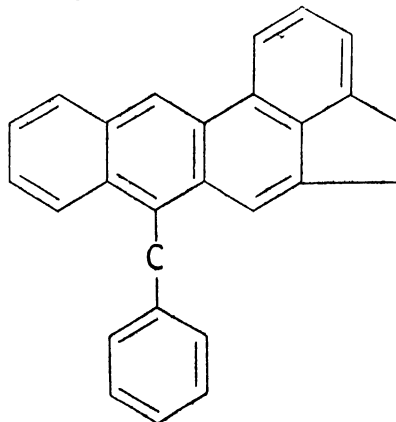
M. P., °C
192²
187⁵

Spiro[3-phenylindane-1,9'-fluorene]



M. P., °C
125–127⁴²

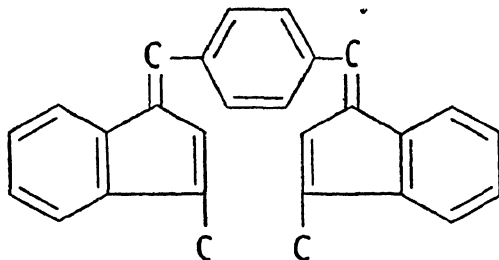
Indo-[4',3'-ab]-10-benzylanthracene



M. P., °C
199–200²⁸

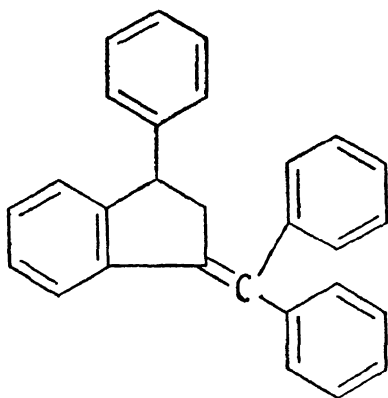


1,4-Di-(3'-methylindenylidene-
methyl)-benzene



M. P., °C
224⁴⁸

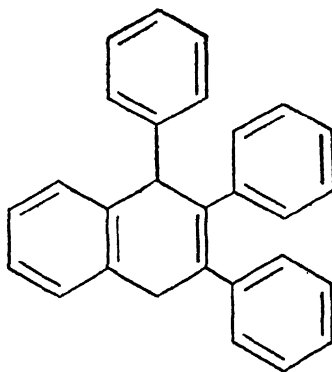
1-Phenyl-3-benzhydrylideneindane



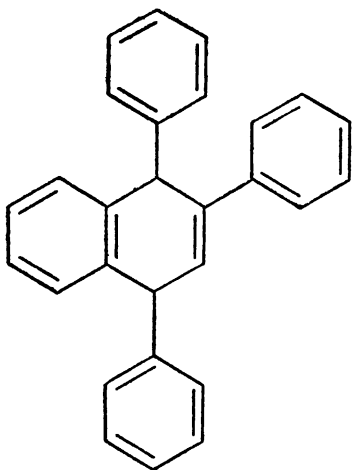
M. P., °C
130-131.5 (a)¹¹
130-131 (a)¹¹
115-117 (a)¹¹
115 (a)¹¹
115⁷¹

(a) These constants were determined
on isomeric forms.

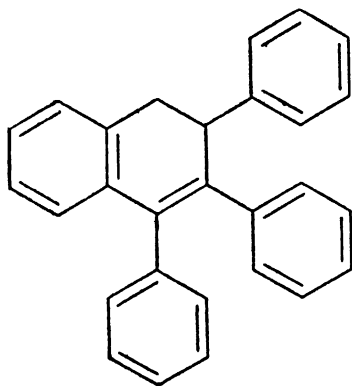
1,2,3-Triphenyl-1,4-dihydronaph-
thalene



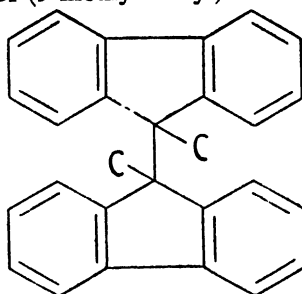
M. P., °C
165⁸

1,2,4-Triphenyl-1,4-dihydronaphthalene

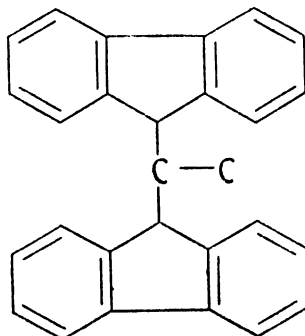
M. P., °C
142.5-144¹⁰

2,3,4-Triphenyl-1,2-dihydronaphthalene

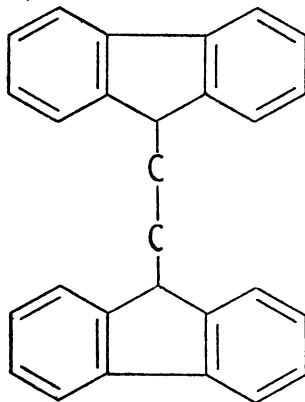
B. P., °C @ 760mm
215 0.5°

9,9'-Bi-(9-methylfluoryl)

M. P., °C
209^{64, 65}
206⁷²

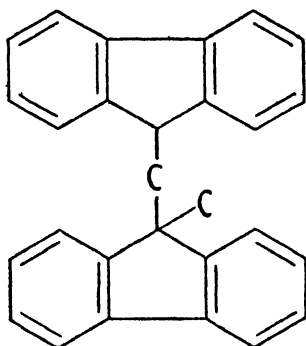
1,1-Di-(9'-fluoryl)-ethane

M. P., °C
262-263⁵²

1,2-Di-(9'-fluoryl)-ethane

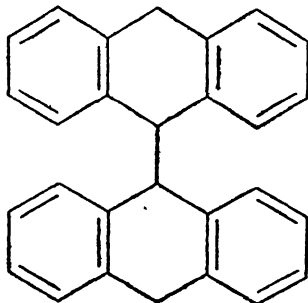
M. P., °C
224-225^{72, 73}
218-219⁷

9-Fluoryl-[9'-(9'-methylfluoryl)]-methane



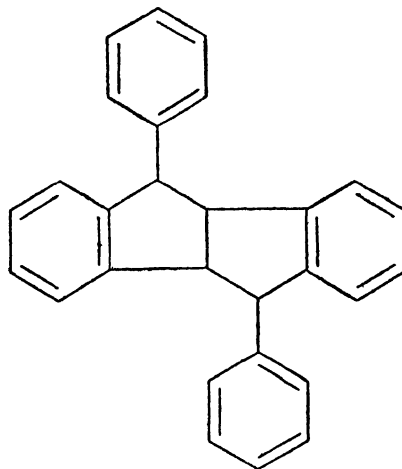
M. P., °C
171-171.5⁷²

Bi-9,9'-(9,10-dihydroanthryl)



M. P., °C
255⁵⁵
248-249⁵³

2,3,6,7-Dibenzo-4,8-diphenylbicyclo-[3,3,0]-octane

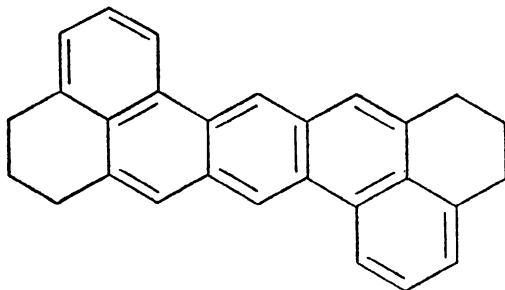


M. P., °C
207-208 (a)¹²
166-167 (a)¹²

(a) These constants were determined on isomeric forms.

This series continued on next page

Dibenzo-[de,op]-1,2,3,8,9,10-hexahydropentacene



M. P., °C
255–256²⁰

$C_{29}H_{24}$

x-Benzyl-x-benzhydrylindene (a)

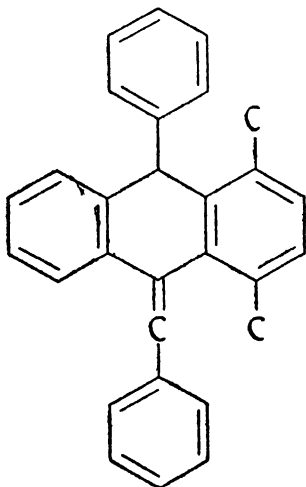
M. P., °C

137–138 (b)⁷⁵

130–131 (b)⁷⁵

- (a) The structure of this compound was not clearly defined in the literature.
(b) These constants probably represent two different compounds.

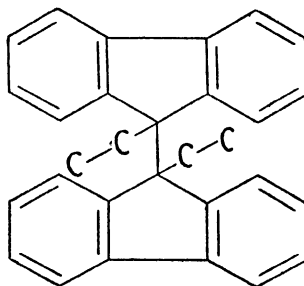
1,4-Dimethyl-9-phenyl-10-benzylidene-9,10-dihydroanthracene



M. P., °C
170³

$C_{30}H_{26}$

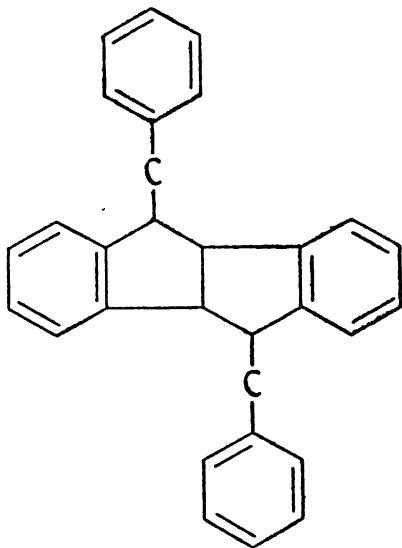
9,9'-Bi-(9-ethylfluorenyl)



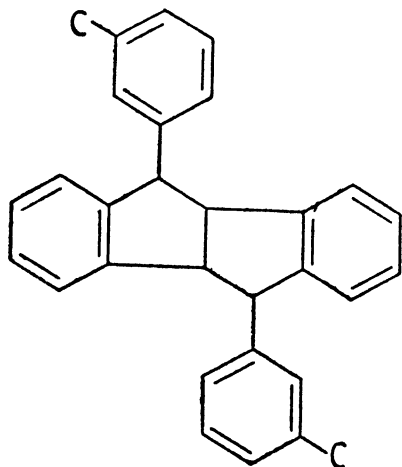
M. P., °C
210^{64, 65}

This series continued on next page

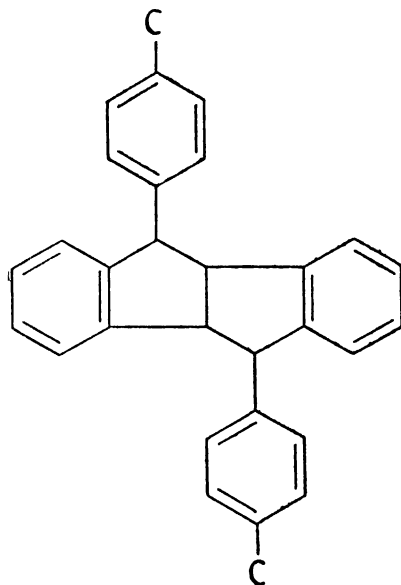
2,3,6,7-Dibenzo-4,8-dibenzylbicyclo-[3,3,0]-octane



M. P., °C
141¹³

2,3,6,7-Dibenzo-4,8-di-*m*-tolylbicyclo-[3,3,0]-octane

M. P., °C
150¹²

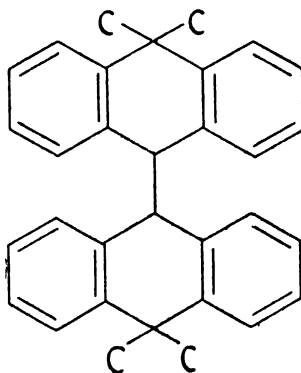
2,3,6,7-Dibenzo-4,8-di-*p*-tolylbicyclo-[3,3,0]-octane

M. P., °C
188–189 (a)¹²
145–146 (a)¹²

(a) These constants were determined on isomeric forms.

C₃₂H₃₀

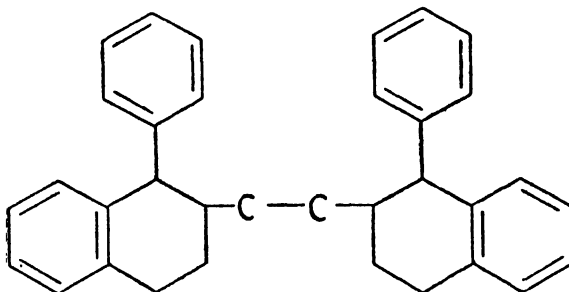
9,9-Bi-(10,10-dimethyl-9,10-dihydroanthryl)



M. P., °C
315⁴



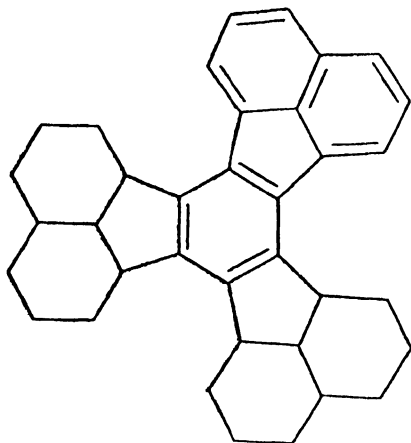
1,2-Di-[2'-(1'-phenyl-1',2',3',4'-tetrahydronaphthyl)]-ethane



M. P., °C

169.5-170.5³⁴

1,2-(2',1'-Acenaphtho)-3,4,5,6-di-[2'',1''-(2a'',3'',4'',5'',5a'',6'',7'',8'',8a'',8b''-decahydroacenaphtho)]-benzene



M. P., °C

245⁶⁷

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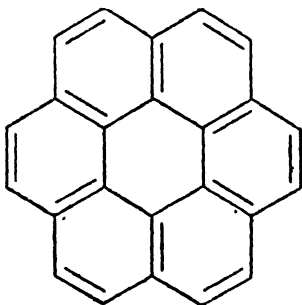
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XVI. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-36}

XVI. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-26}



Coronene



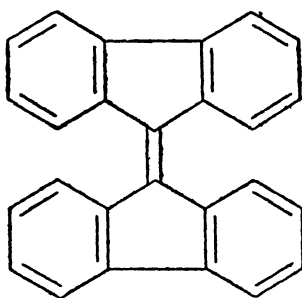
M. P., °C

435³⁵

429–430⁶⁸



9,9'-Bifluorylidene



M. P., °C

187.5

189–190^{27, 40, 44}

189^{50, 53}

187–189⁴³

188^{39, 77}

187–188^{38, 72}

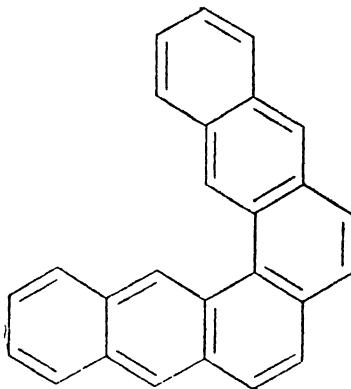
187^{42, 70, 76, 84}

186–187⁶⁶

185⁶⁹

184^{41, 63}

1,2-(4',3'-Anthro)-anthracene

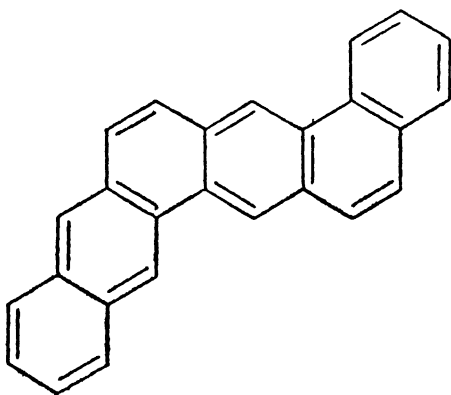


M. P., °C

308²⁴

304²⁶

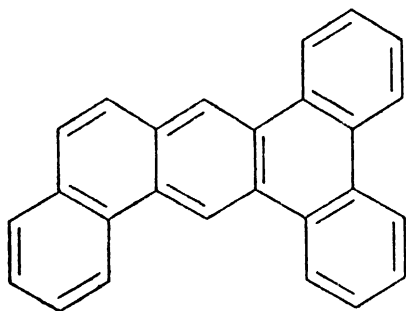
1,2-Benzo-5,6-(3',2'-naphtho)-anthracene



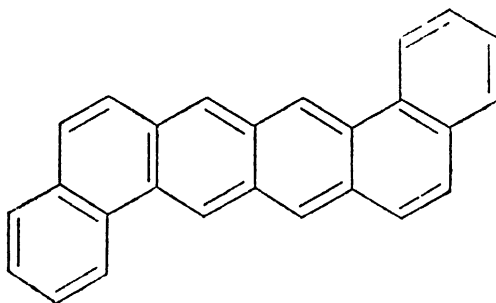
M. P., °C

281–282²⁵

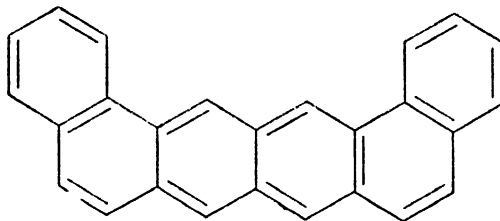
281⁸²

1,2,3,4,5,6-Tribenzoanthracene

M. P., °C
224³⁴
223²⁶

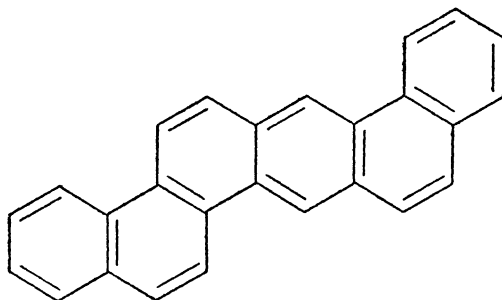
1,2,7,8-Dibenzonaphthacene

M. P., °C
345²³

1,2,9,10-Dibenzonaphthacene

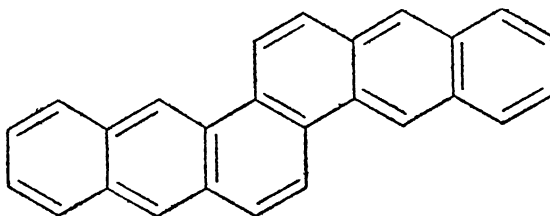
M. P., °C
341-343²⁵

2,3-(4',3'-Naphtho)-chrysene
(3,4,8,9-Dibenzotetraphene)



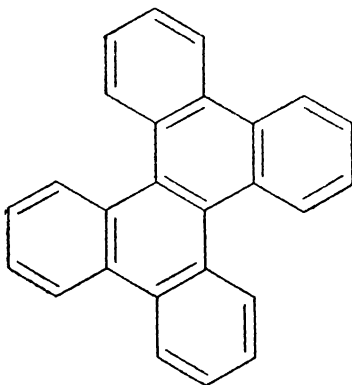
M. P., °C
385²³

2,3,8,9-Dibenzochrysene



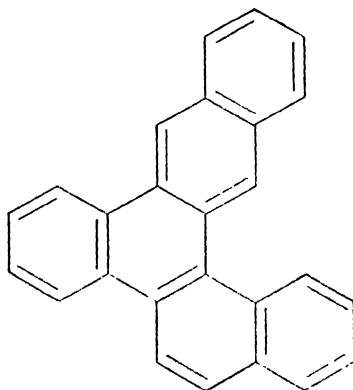
M. P., °C
389²⁶

5,6,11,12-Dibenzochrysene



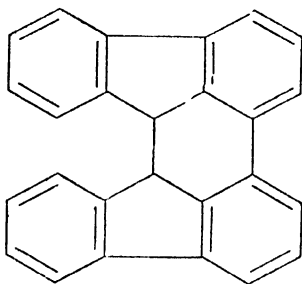
M. P., °C
218⁷⁶
215⁸

2,3,5,6-Dibenzotriphenylene



M. P., °C
185-186¹³

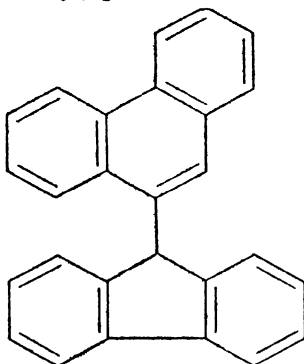
Difluoro-[1,9-ab,8',9'-de]-cyclohexane
(1,9,8',9'-Bifluorenylene)



M. P., °C
 218^{31, 33}

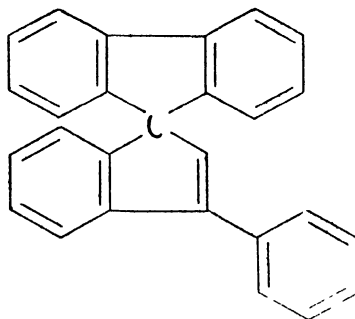
$C_{27}H_{18}$

9-(9'-Fluoryl)-phenanthrene



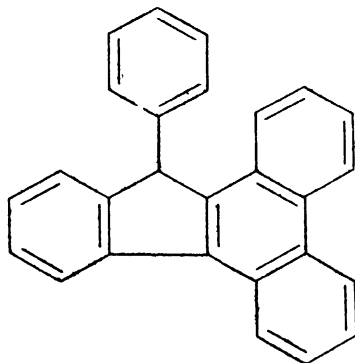
M. P., °C
 196-197¹

Spiro[3-phenylindene-1,9'-fluorene]



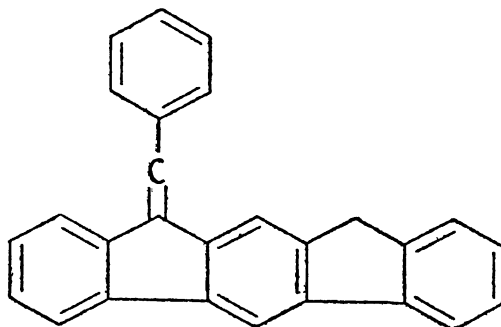
M. P., °C
 194-197⁴⁷
 140-141⁴⁵

1,2,3,4-Dibenzo-9-phenylfluorene



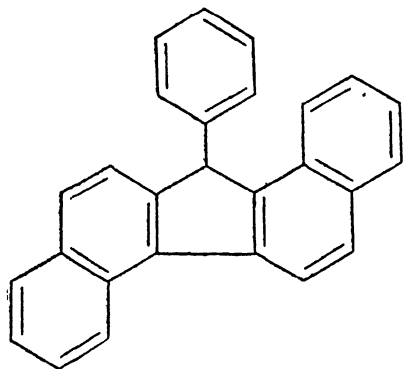
M. P., °C
 210-211^{1, 46}
 209⁴⁸

2,3-(2',3'-Indo)-9-benzylidene fluorene



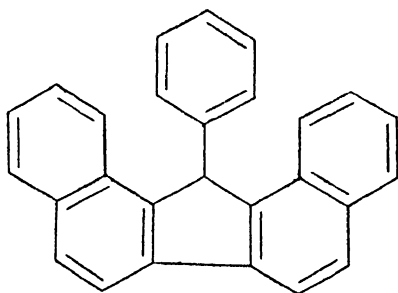
M. P., °C
 107⁵⁷

1,2,5,6-Dibenzo-9-phenylfluorene



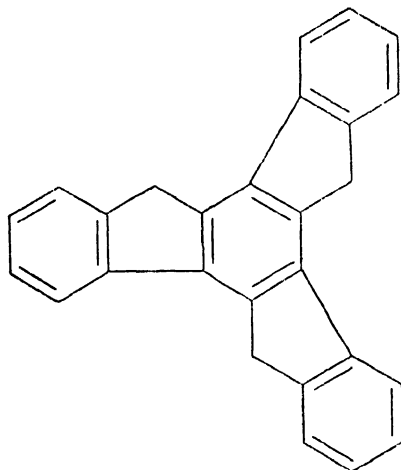
M. P., °C
219-219.5¹²

1,2,7,8-Dibenzo-9-phenylfluorene



M. P., °C
273⁶⁷
148.5-149.5¹²

1,2,3,4,5,6-Tri-(3',2'-indo)-
benzene
(Truxene) (a)

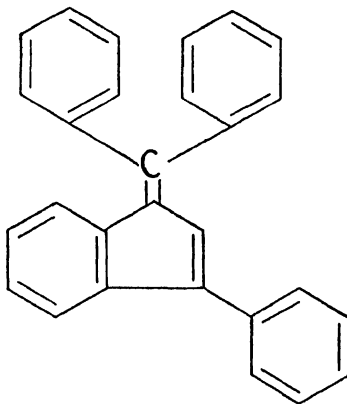


M. P., °C
391⁷¹
369-370⁷⁴
368²
365⁷⁸
364-365³⁰
330⁷³

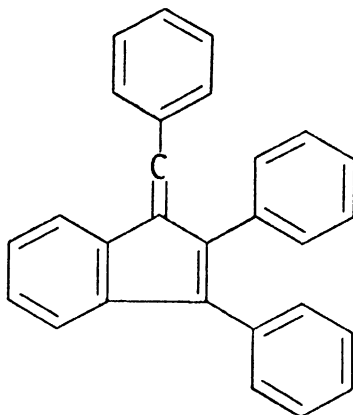
(a) This compound was thought by some investigators to be 2,3,2',3'-Biindenylene or 2,3,3',2'-Biindenylene.

C₂₈H₂₀

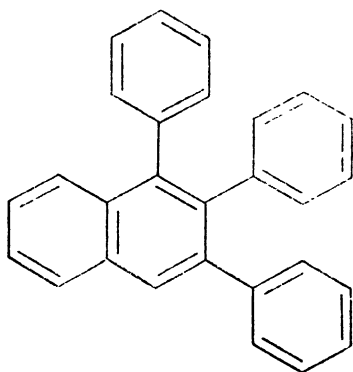
1-Benzhydrylidene-3-phenylindene



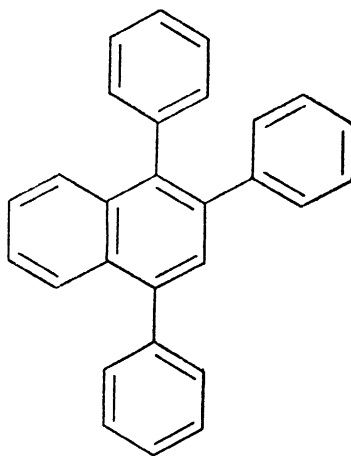
M. P., °C
207-208¹⁷

207^{18, 19}205–206^{80, 87, 88}**1-Benzylidene-2,3-diphenylindene**

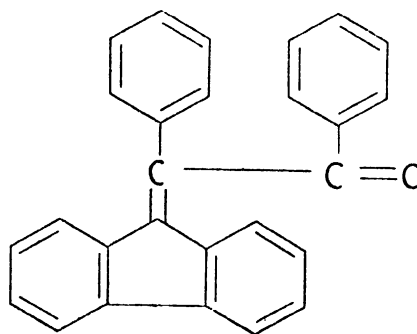
M. P., °C

184–185^{53, 59, 61}**1,2,3-Triphenylnaphthalene**

M. P., °C

153–154¹¹152–153.5²¹151⁶⁵**1,2,4-Triphenylnaphthalene**

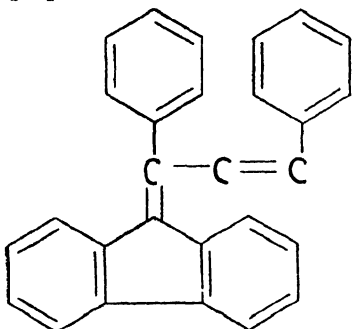
M. P., °C

158–159¹⁵**1-(9'-Fluorylidene)-1,2-diphenylpropene-2**

M. P., °C

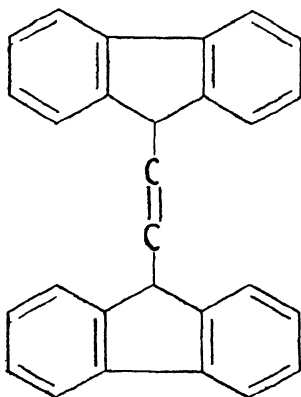
197–198⁴⁹

1-(9'-Fluorylidene)-1,3-diphenylpropene-2



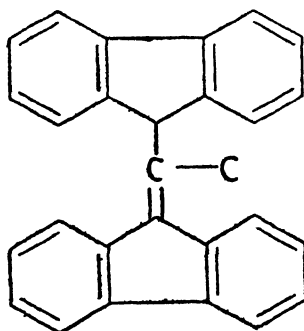
M. P., °C
183-184⁹

1,2-Di-(9'-fluoryl)-ethene



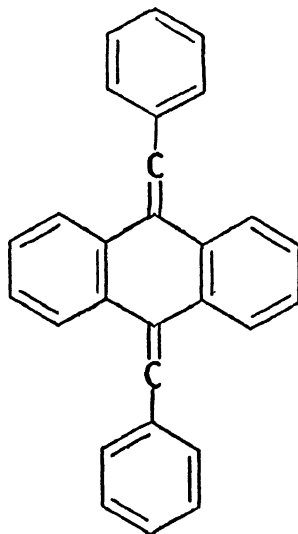
M. P., °C
267-268⁸³
267⁸¹

9-Fluoryl-9'-fluorylidene-methyl-methane



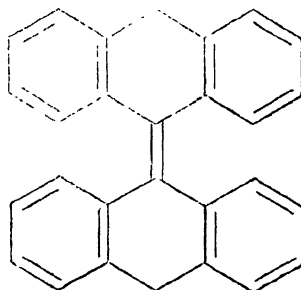
M. P., °C
> 350⁸³

9,10-Dibenzylidene-9,10-dihydroanthracene



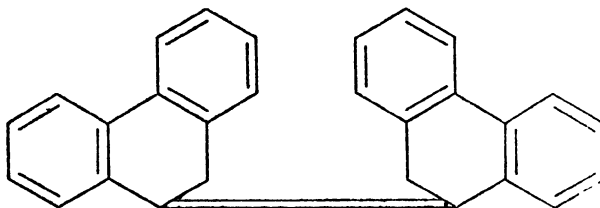
M. P., °C
237-240⁸¹
234-236⁸¹
199-200⁷

9,9'-Bi-9,10-dihydroanthrylidene



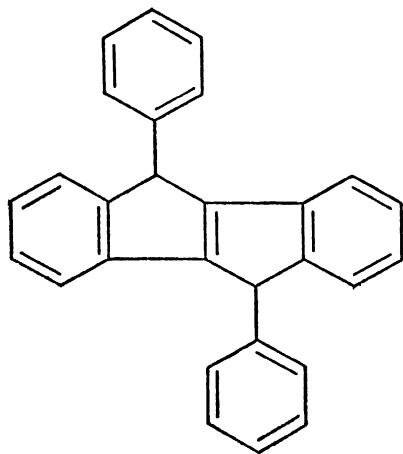
M. P., °C
298-300⁸⁸

9,9'-Bi-9,10-dihydrophenanthrylidene



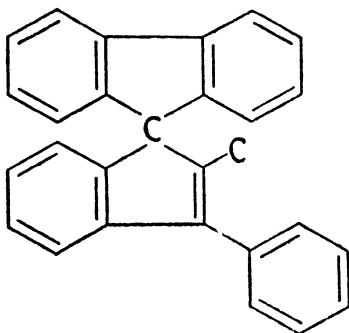
M. P., °C
303⁸

2,3,6,7-Dibenzo-4,8-diphenylbicyclo-[3,3,0]-octene-1,5



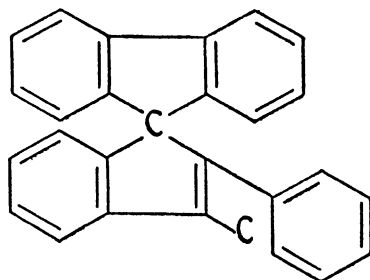
M. P., °C
285-286²⁰

Spiro[2-methyl-3-phenylindene-1,9'-fluorene]



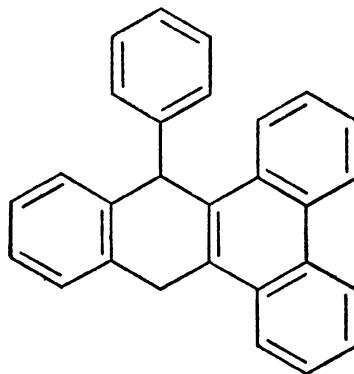
M. P., °C
173-174.5⁴⁹

Spiro[2-phenyl-3-methylindene-1,9'-fluorene]



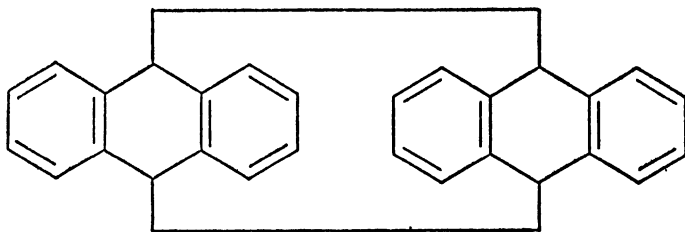
M. P., °C
152.5-153.5⁴⁹

1,2,3,4-Dibenzo-9-phenyl-9,10-dihydroanthracene



M. P., °C
192¹⁰

9,10,9',10'-Bi-(9,10-dihydroanthryl-
ene)
(Paranthracene)



M. P., °C

243.5

244⁴, 11, 78

242-244⁶¹

242-243⁸⁶

240⁵²

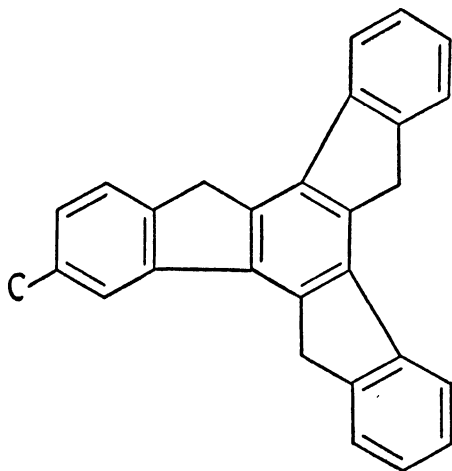
D_4^{20}

1.265⁶¹

1.261 (a)¹⁴

(a) The temperature of this determination was not given.

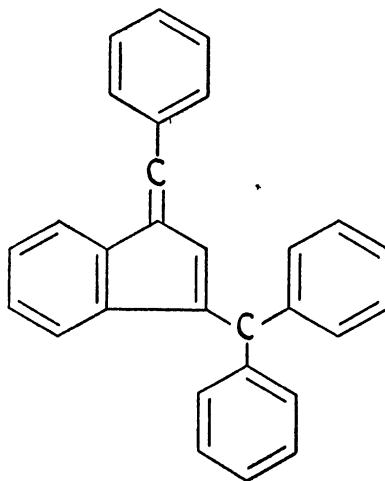
1,2,3,4-Di-(3',2'-indo)-5,6-[3'',2''-(5''-methylindo)]-benzene



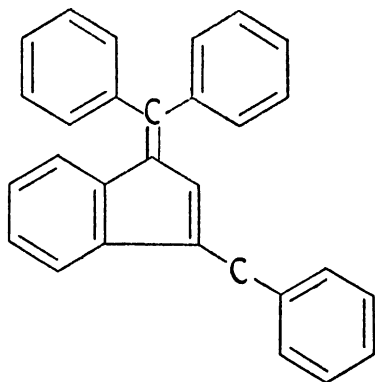
M. P., °C
423⁷¹

C₂₉H₂₂

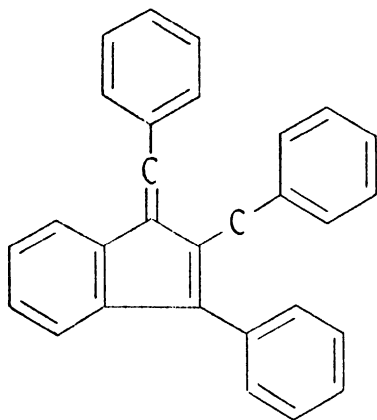
1-Benzylidene-3-benzhydrylindene



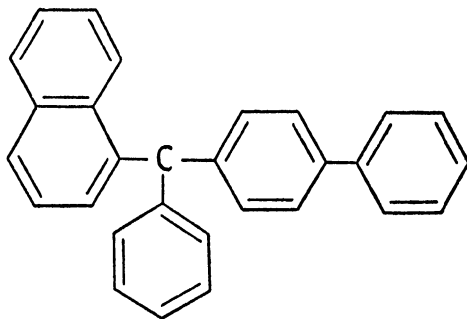
M. P., °C
131.5-132.5⁸⁵
130²⁸

1-Benzhydrylidene-3-benzylindene

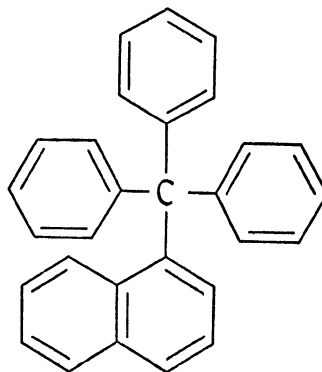
M. P., °C
130-130.5⁸⁵

1-Benzylidene-2-benzyl-3-phenylindene

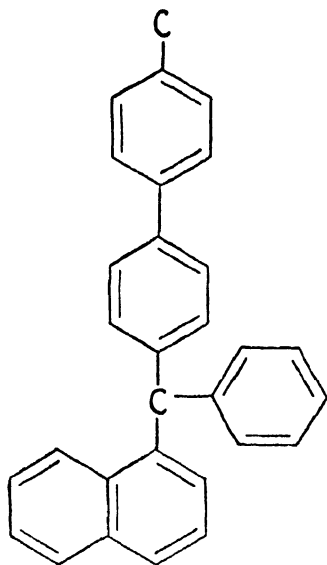
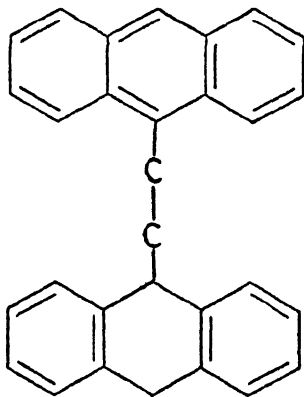
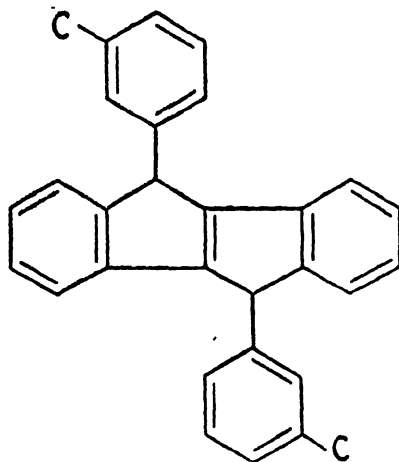
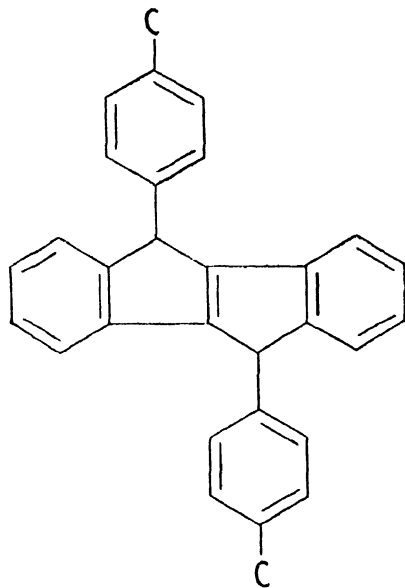
M. P., °C
177.5-179¹⁶
174-175⁶⁰

1-Naphthyl-*p*-biphenylphenylmethane

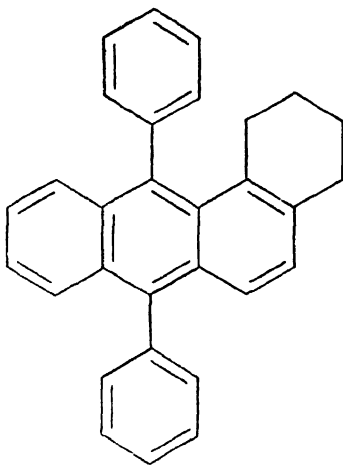
M. P., °C
281-282³

1-Naphthyltriphenylmethane

M. P., °C
193⁷⁹

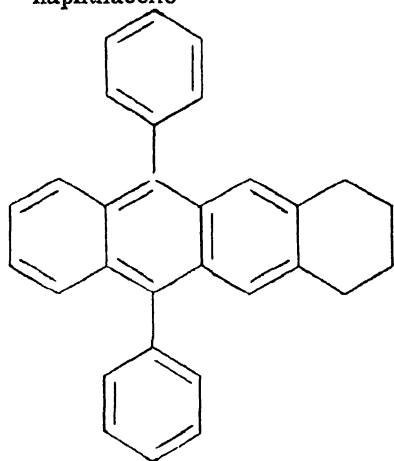
C₃₀H₂₄1-Naphthyl-(4'-methyl-*p*-biphenyl)-
phenylmethaneM. P., °C
171³⁷1-(9'-Anthryl)-2-[9''-(9'',10''-dihy-
droanthryl)]-ethaneM. P., °C
308⁵2,3,6,7-Dibenzo-4,8-di-*m*-tolylbi-
cyclo-[3,3,0]-octene-1,5M. P., °C
179-180²⁰2,3,6,7-Dibenzo-4,8-di-*p*-tolylbi-
cyclo-[3,3,0]-octene-1,5M. P., °C
200²⁰

1,2-Cyclohexano-9,10-diphenyl-anthracene



M. P., °C
235-236⁶⁶

6,11-Diphenyl-1,2,3,4-tetrahydronaphthacene



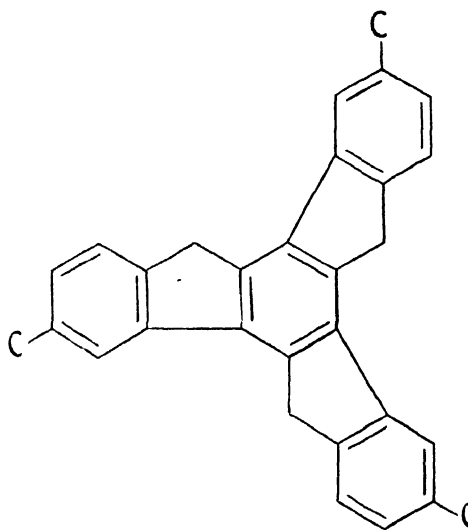
M. P., °C
298²⁹

α_6 -Hexahydroheptacene (a)

M. P., °C
354⁶⁴

(a) The structure of this compound was not clearly defined in the literature.

1,2,3,4,5,6-Tri-[3',2'-(5'-methyl-endo)]-benzene



M. P., °C
447⁷¹

α -Diphenyltruxane (a)

M. P., °C
201-202⁷⁵

(a) The structure of this compound was not clearly defined in the literature.

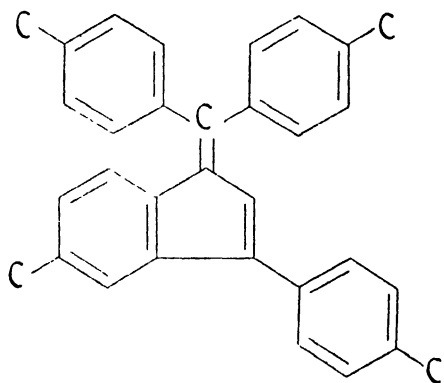
γ -Diphenyltruxane (a)

M. P., °C
169-171⁷⁵

(a) The structure of this compound was not clearly defined in the literature.



1-(Di-*p*-tolylmethylene)-3-*p*-tolyl-5-methylindene



M. P., °C
192–193²²



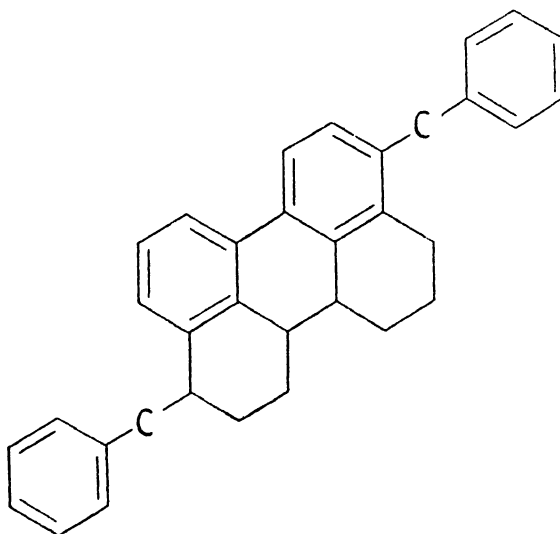
1,2,3,4,5,6-Tri-[3',2'-(x₆-hexahydronaphtho)-cyclobutano]-benzene (a)

M. P., °C
124–128³²

(a) The structure of this compound was not clearly defined in the literature.

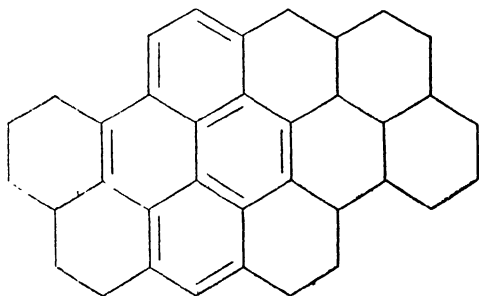


3,9-Dibenzyl-4,5,6,6a,6b,7,8,9-octahydroperylene



M. P., °C
154⁸⁹

**Didecahydronaphtho-[2',1',8'-
bcd, 2'',1'',8''-klm]-1,2,2a,3,4,
4a,5,6-octahydrocoronene**



M. P., °C
340³⁵

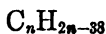
*References on Polynuclear Aromatics of
Empirical Formula C₂₆H₁₈₋₁₆*

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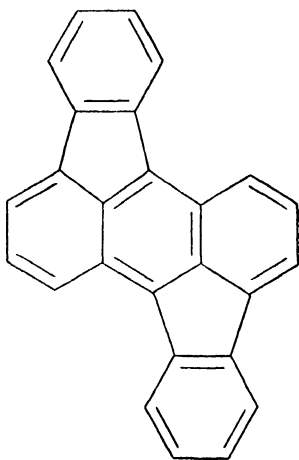
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XVII. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA
 C_nH_{2n-38}

XVII. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA



Diindo-[3,2,1-de,3',2',1'-kl]-anthracene
(Rubicene)



M. P., °C

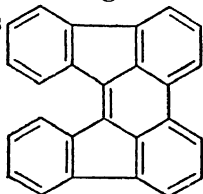
306³¹

306 (a)^{36, 37}

306 (b)²⁶

305 (b)²⁷

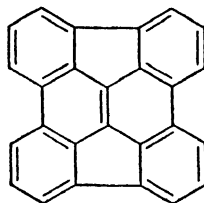
(a) The structural formula of this compound was given in the literature as



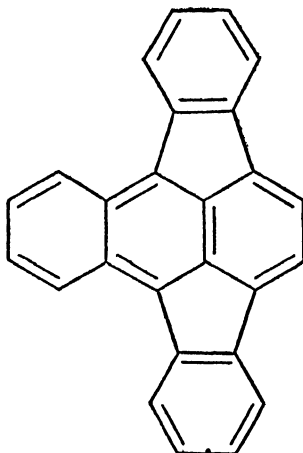
, but later work proved the above formula to be correct for rubicene.

(b) This compound is given the formula $C_{26}H_{12}$ in the literature.

The structural formula is given as follows:



Diindo-[3,2,1-de,3',2',1'-mn]-anthracene
(Isorubicene)

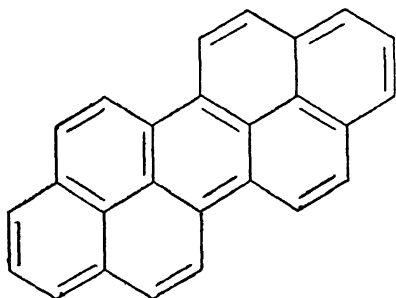


M. P., °C

335 (a)¹⁸

(a) This compound sinters at 330.

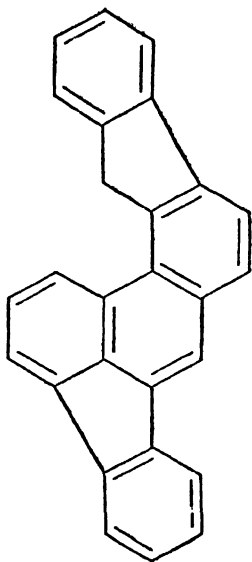
Dibenzo-[cd,lm]-perylene
(Peropyrene)



M. P., °C
374–375²⁰

$C_{27}H_{16}$

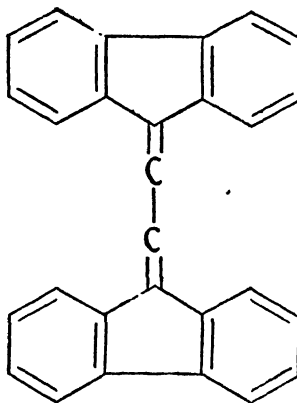
Diindo-[3,2-c,1',2',3'-jk]-phenanthrene



M. P., °C
198–199⁴⁴

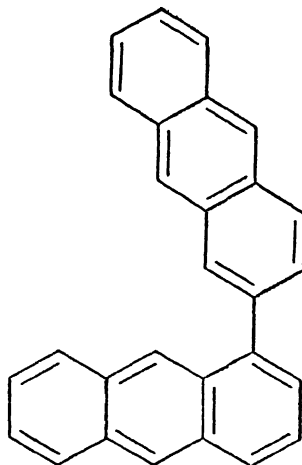
$C_{28}H_{18}$

1,2-Di-(9'-fluorylidene)-ethane

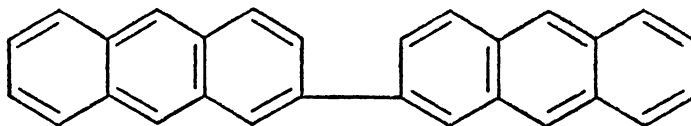


M. P., °C
372–374⁴⁵
360⁴³

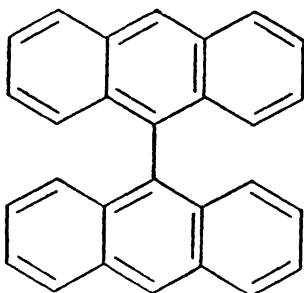
1,2'-Bianthryl



Additional Data
Sublimation Temp. (°C)
330¹⁰

2,2'-Bianthryl

M. P., °C
355–355.5³⁹

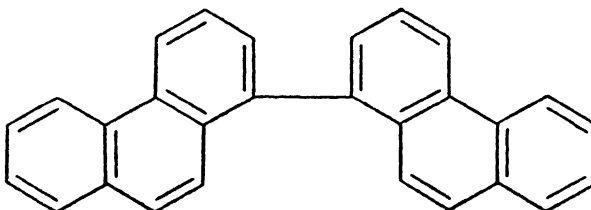
9,9'-Bianthryl

M. P., °C
319–320²⁵
308–310^{16, 19}
304³⁸
300–302⁸
300^{28, 32, 35, 40}

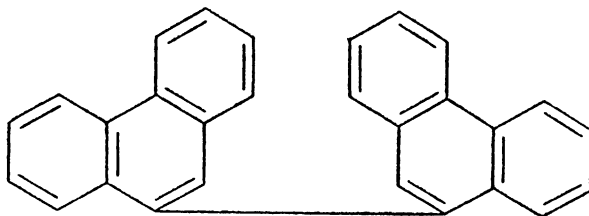
Isodianthryl (a)

M. P., °C
312⁵

(a) The structure of this compound was not clearly defined in the literature.

1,1'-Biphenanthryl

M. P., °C
224–226³⁰

9,9'-Biphenanthryl

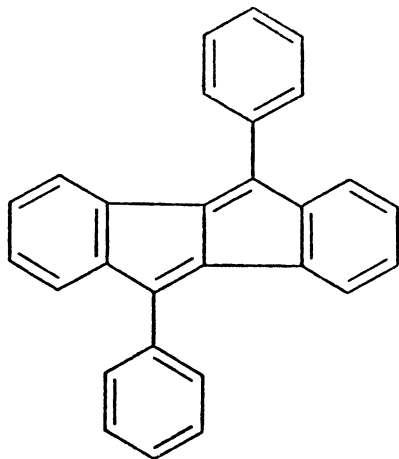
M. P., °C

188–189⁴⁶184–185³**x, x'-Biphenanthryl (a)**

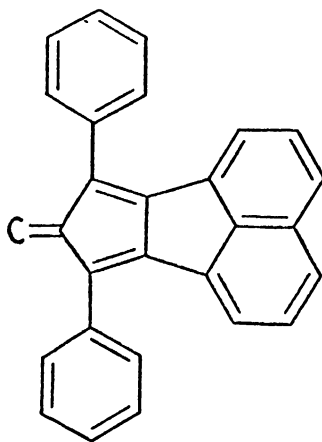
M. P., °C

308³⁴

- (a) The structure of this compound was not clearly defined in the literature.

3,4,7,8-Dibenzo-2,6-diphenylbicyclo-[3,3,0]-octadiene-1,5

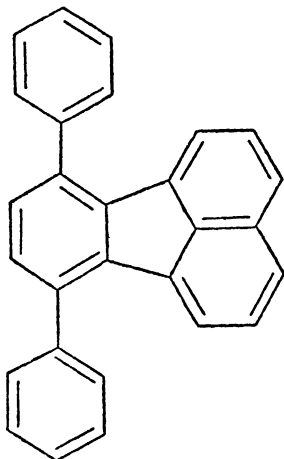
M. P., °C

259–260¹¹259¹³**1,4-Diphenyl-2,3-(2',1'-acenaphtho)-5-methylenecyclopentadiene-1,3**

M. P., °C

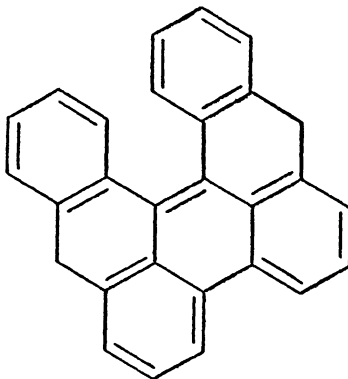
225–226²³*This series continued on next page*

1,4-Diphenyl-2,3-(2',1'-acenaphtho)-benzene



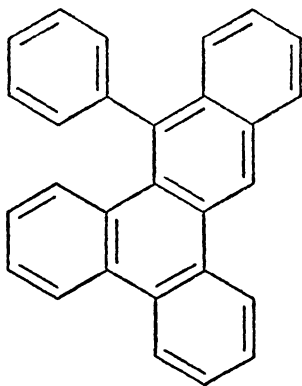
M. P., °C
162-163²²
160-161¹

1,2,11,12-Dibenzo-3,10-dihydroperylene

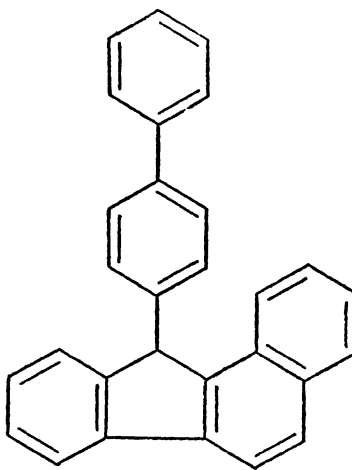


M. P., °C
269-270¹⁷

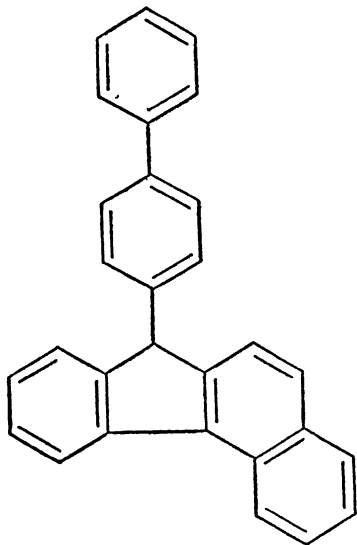
2,3-Benzo-1-phenyltriphenylene



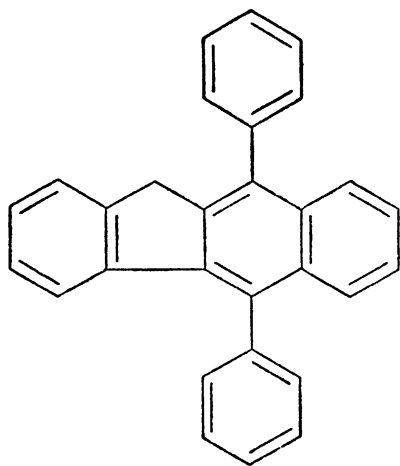
M. P., °C
227^{8, 9}

C₂₉H₂₀1,2-Benzo-9-*p*-biphenylfluorene

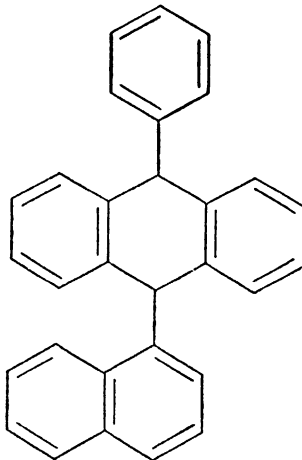
M. P., °C
276^{28A}

3,4-Benzo-9-*p*-biphenylfluorene

M. P., °C
275–276²¹

2,3-Benzo-1,4-diphenylfluorene

M. P., °C
199⁴²

 $C_{30}H_{22}$ **9-Phenyl-10-(1'-naphthyl)-9,10-dihydroanthracene**

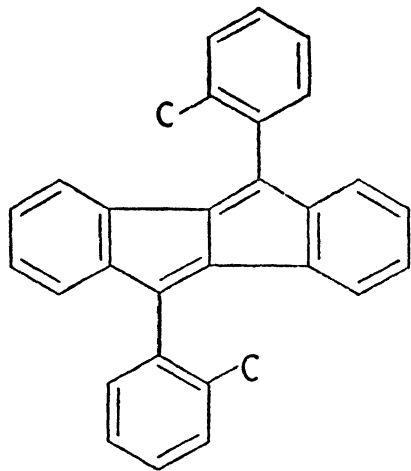
M. P., °C
225²⁹

***x,x'*-(*x'',x'''*-Diphenanthryl)-ethane**
(a)

M. P., °C
252.5–251.5⁴¹

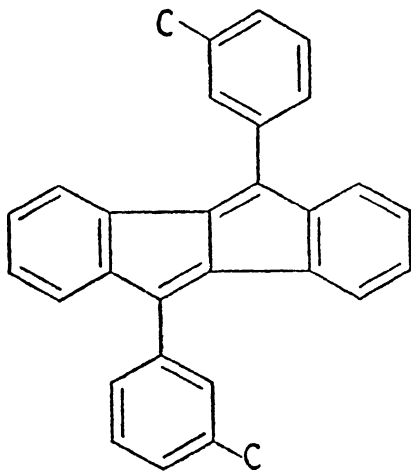
(a) The structure of this compound was not clearly defined in the literature.

3,4,7,8-Dibenzo-2,6-di-*o*-tolylbicyclo-[3,3,0]-octadiene-1,5



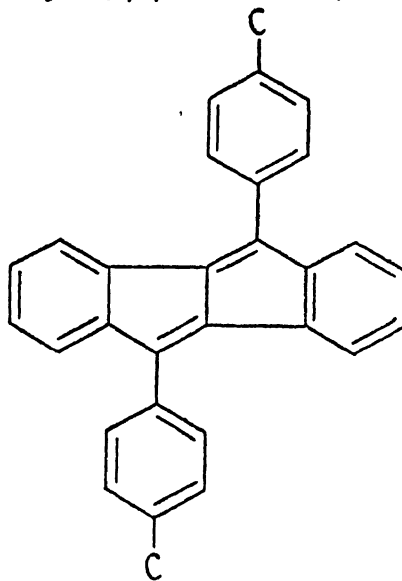
M. P., °C
240¹²

3,4,7,8-Dibenzo-2,6-di-*m*-tolylbicyclo-[3,3,0]-octadiene-1,5



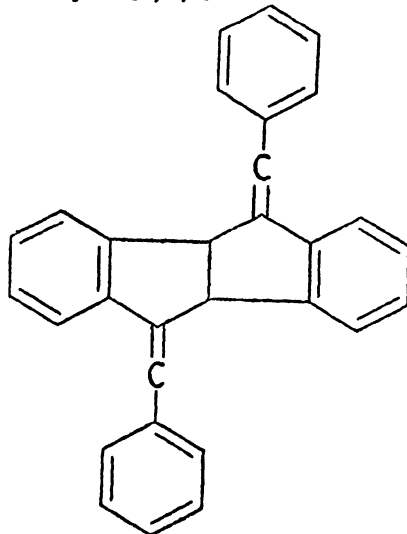
M. P., °C
184-185¹²
184¹³

3,4,7,8-Dibenzo-2,6-di-*p*-tolylbicyclo-[3,3,0]-octadiene-1,5



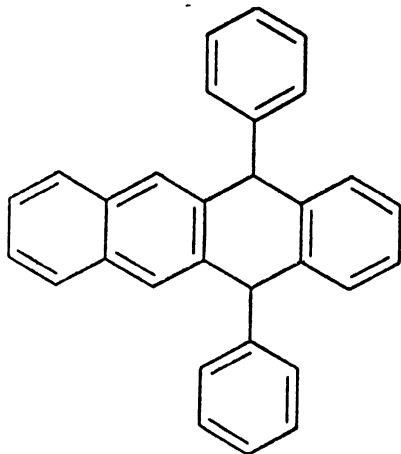
M. P., °C
271-272¹¹
271¹³

3,4,7,8-Dibenzo-2,6-dibenzylidenebicyclo-[3,3,0]-octane



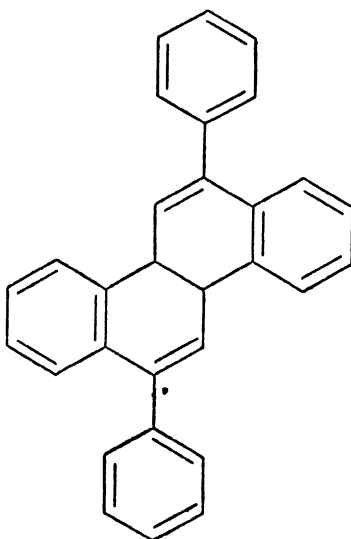
M. P., °C
255^{14, 15}

5,12-Diphenyl-5,12-dihydronaphthalene



M. P., °C
206–207²¹

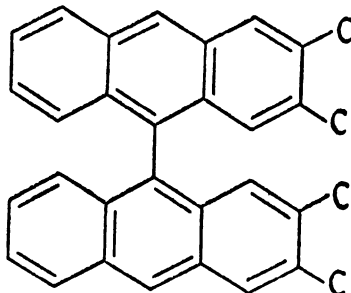
6,12-Diphenyl-4b,10b-dihydrochrysene



M. P., °C
265–266²³

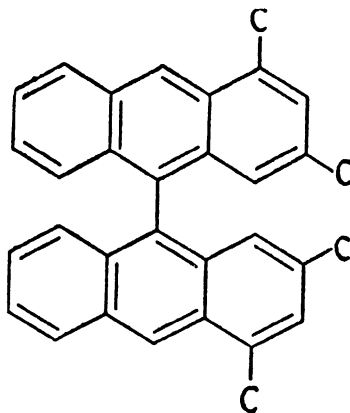
$C_{32}H_{26}$

9,9'-Bi-2,3-dimethylanthryl



M. P., °C
310⁴

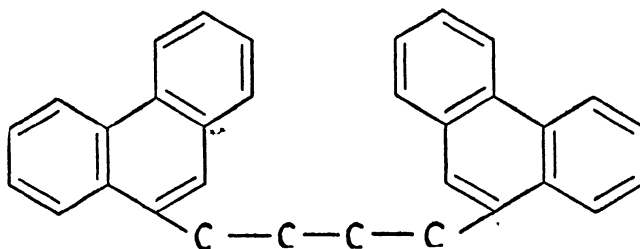
10,10'-Bi-1,3-dimethylanthryl



M. P., °C
284⁴

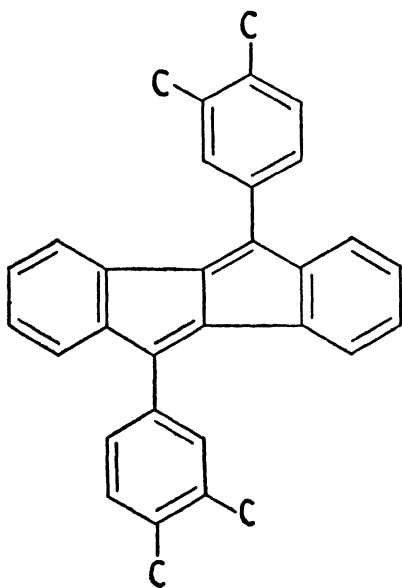
This series continued on next page

1,4-Di-(9'-phenanthryl)-butane



M. P., °C
214-216⁷

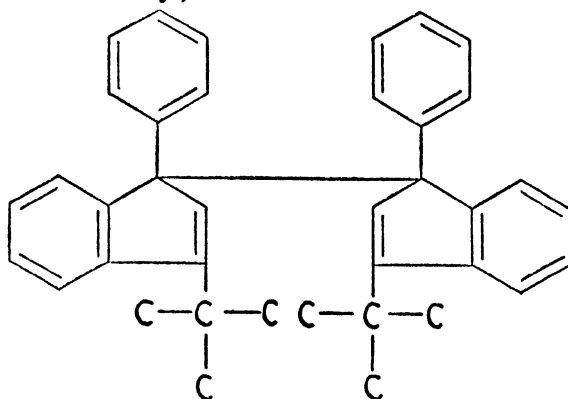
3,4,7,8-Dibenzo-2,6-di-(3',4'-dimethylphenyl)bicyclo-[3,3,0]-octadiene-1,5



M. P., °C
212¹²

This series continued on next page

$C_{38}H_{38}$
**1,1'-Bi-(1-phenyl-3-*tert*-butylin-
 denyl)**



M. P., °C
 150-151²

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 Empirical Formula C_nH_{2n-38}*

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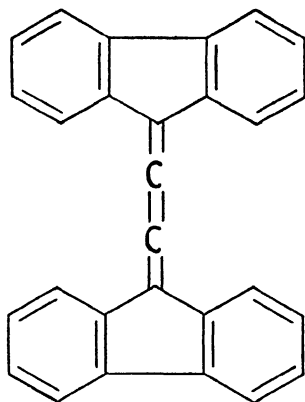
XVIII. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA
 C_nH_{2n-40}

XVIII. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA

C_nH_{2n-40}

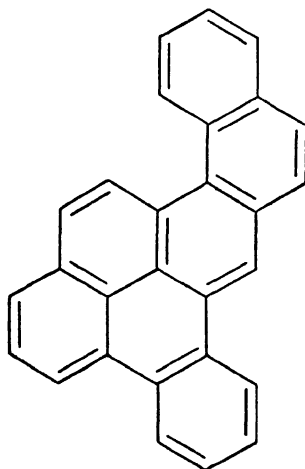
$C_{28}H_{16}$

1,2-Di-(9'-fluorylidene)-ethene



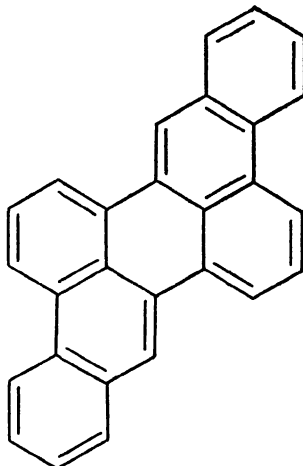
M. P., °C
330³²

1,2-(4',3'-Naphtho)-4,5-benzo-
pyrene



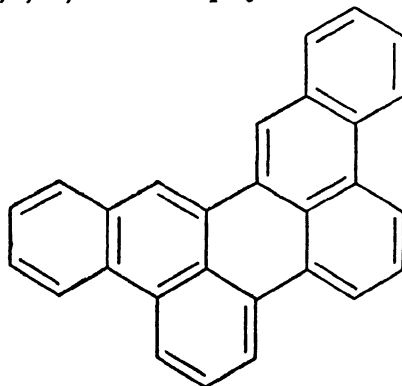
M. P., °C
242-244²⁴

2,3,8,9-Dibenzoperylene



M. P., °C
310-343^{26, 27}
299-300³⁹

2,3,10,11-Dibenzoperylene



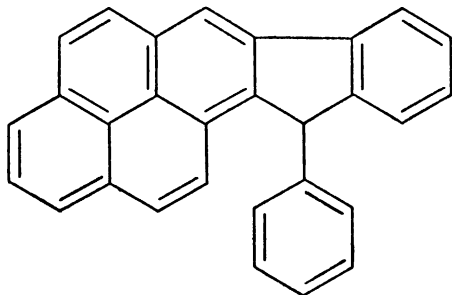
M. P., °C
343-345 (a)³⁹
343 (a)^{9, 14}
315-318 (a)^{26, 27}

(a) Clar ("Aromatische Kohlenwasserstoffe," Springer-Verlag, Berlin, 1941, p. 236) indicates that

these are three different compounds, but does not assign a definite structure to the compound in references 26, 27, and 39.



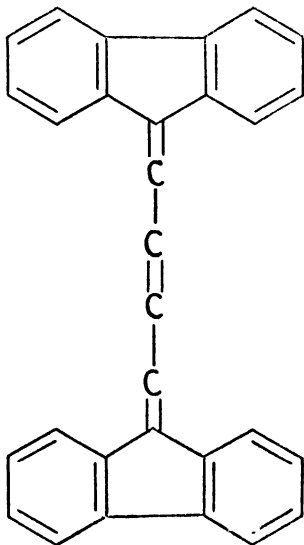
2,3-[3',2'-(1'-Phenylindo)]-pyrene



M. P., °C
279–280¹⁵

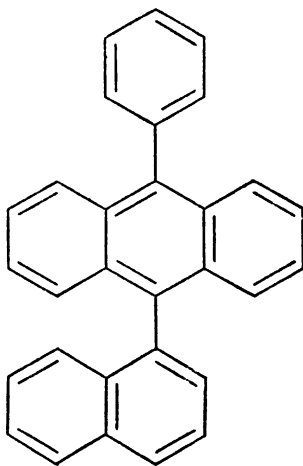


1,4-Di-(9'-fluorylidene)-butene-2



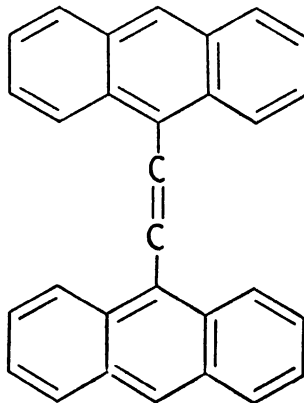
M. P., °C
340³⁴
331–332³³

9-Phenyl-10-(1'-naphthyl)-anthracene



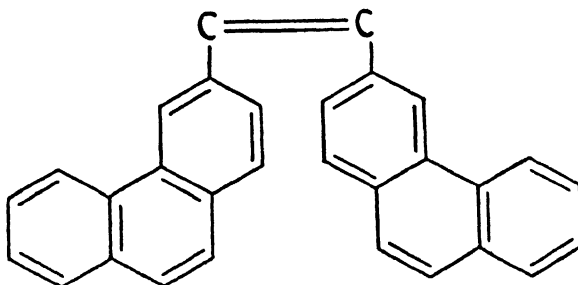
M. P., °C
244–245⁴
229²⁵

1,2-Di-(9'-anthryl)-ethene



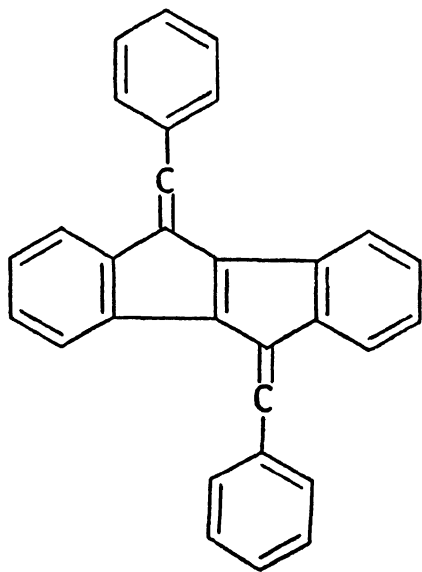
M. P., °C
337³⁸

1,2-Di-(3'-phenanthryl)-ethene



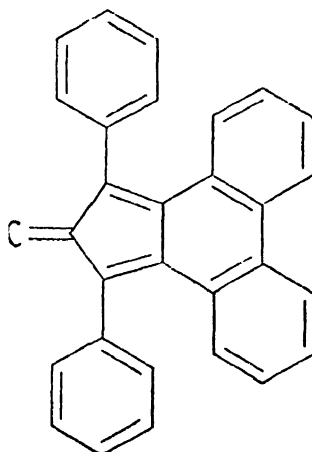
M. P., °C
289³⁸

2,3,6,7-Dibenzo-4,8-dibenzylidene-bicyclo-[3,3,0]-octene-1,5

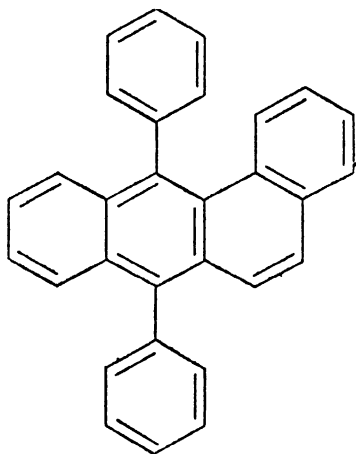


M. P., °C
244⁸

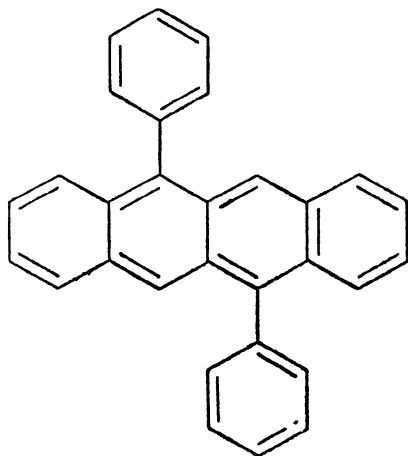
2,3-(9',10'-Phenanthro)-1,4-diphenyl-5-methylenecyclopentadiene-1,3



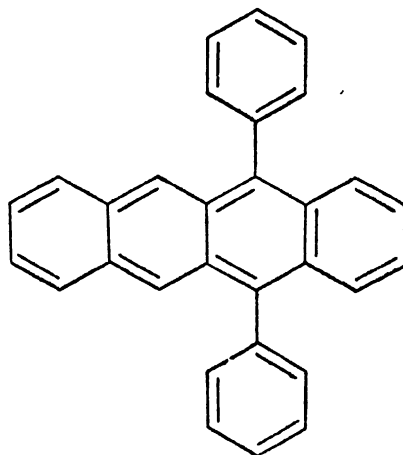
M. P., °C
239-240¹⁸

1,2-Benzo-9,10-diphenylanthracene

M. P., °C
192¹³

5,11-Diphenylnaphthacene
(Diphenylrubene)

M. P., °C
301-302²¹

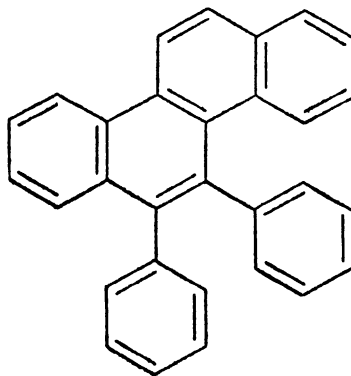
5,12-Diphenylnaphthacene

M. P., °C
207-208²⁰

x,x-Diphenylnaphthacene (a)

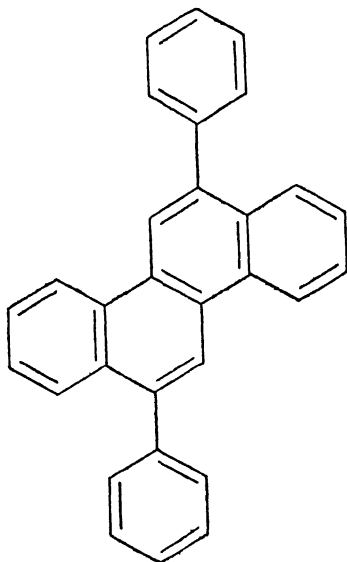
M. P., °C
258²²

(a) The structure of this compound was not clearly defined in the literature.

5,6-Diphenylchrysene

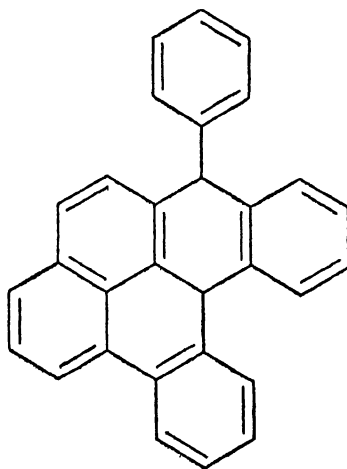
M. P., °C
208-209¹⁷

6,12-Diphenylchrysene



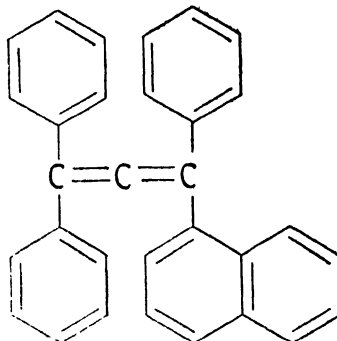
M. P., °C
285¹⁵

2,3,4,5-Dibenzo-1-phenyl-1,3a-dihydropyrene



M. P., °C
257-258¹³

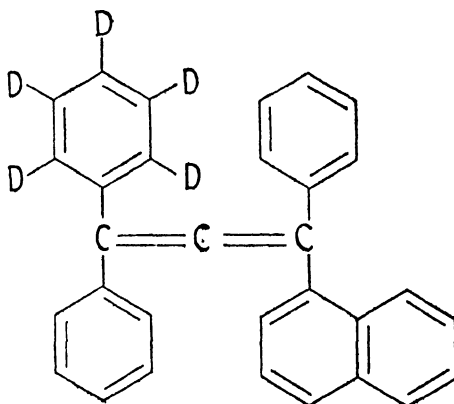
1,1,3-Triphenyl-3-(1'-naphthyl)-propadiene



M. P., °C
142 (a)¹⁶
100-102 (a)¹⁶

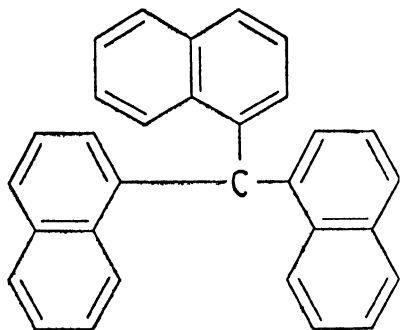
(a) These constants were determined on different crystalline forms.

1,3-Diphenyl-1-pentadeuterophenyl-3-(1'-naphthyl)-propadiene

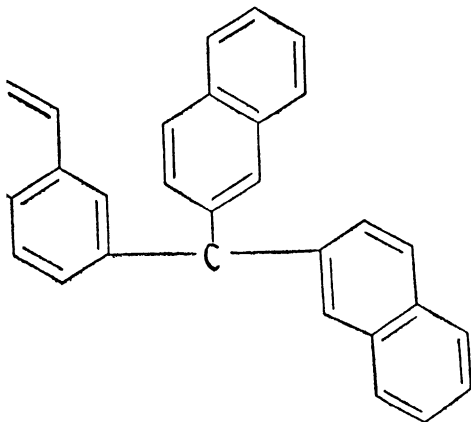


M. P., °C
142 (a)¹⁶
100-101 (a)¹⁶

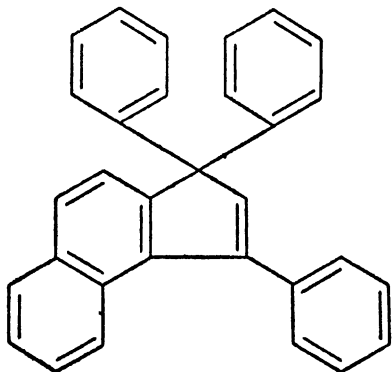
These constants were determined on different crystalline forms.

Tri-(1-naphthyl)-methane

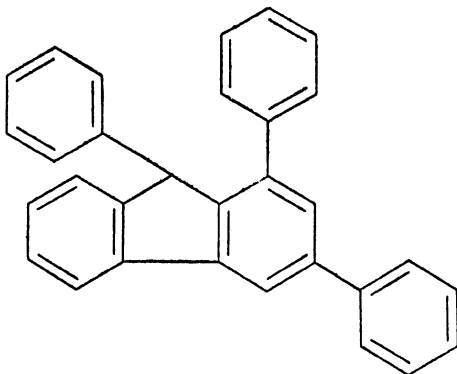
M. P., °C
191¹¹

Tri-(2-naphthyl)-methane

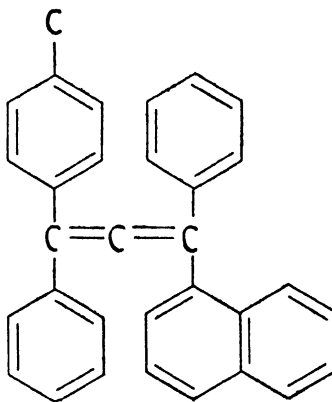
M. P., °C
178-179¹²

4,5-Benzo-1,1,3-triphenylindene

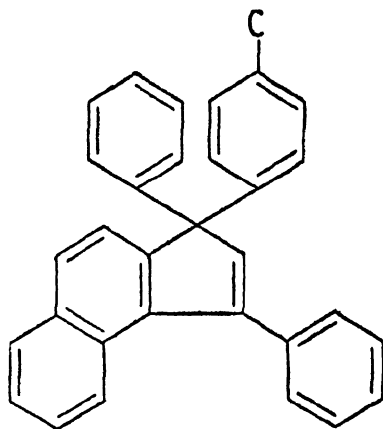
M. P., °C
234¹⁶

1,3,9-Triphenylfluorene

M. P., °C
149³¹

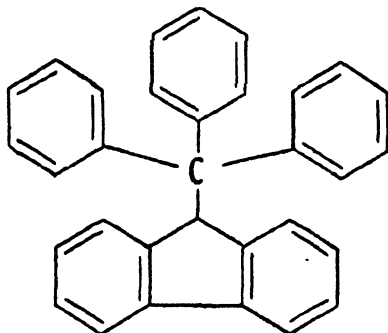
 $C_{32}H_{24}$ **1,3-Diphenyl-1-*p*-tolyl-3-(1'-naphthyl)-propadiene**

M. P., °C
119-120¹⁶

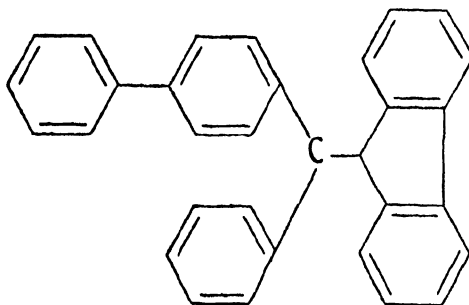
4,5-Benzo-1,3-diphenyl-1-*p*-tolylidene

M. P., °C
172-175¹⁸

(9-Fluoryl)-triphenylmethane

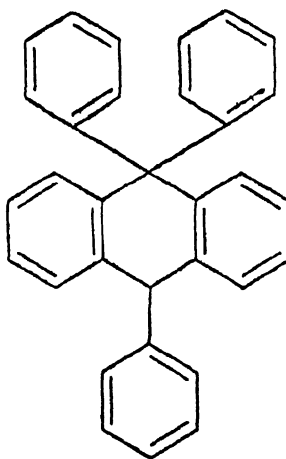


M. P., °C
258-260²⁸
248-256 (in nitrogen)²
234-235²

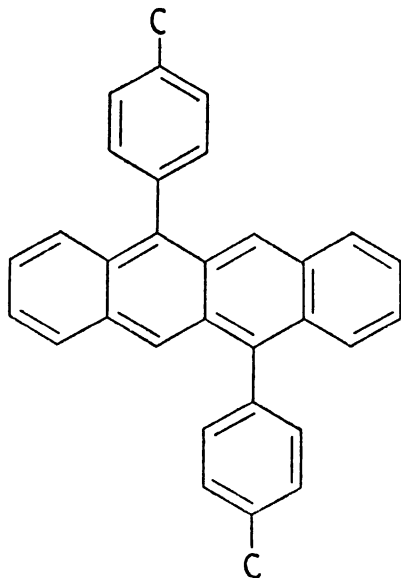
Phenyl-*p*-biphenyl-(9'-fluoryl)-methane

M. P., °C
253-254⁶

9,9,10-Triphenyl-9,10-dihydroanthracene



M. P., °C
230³
226-227³⁷
223-225²⁹

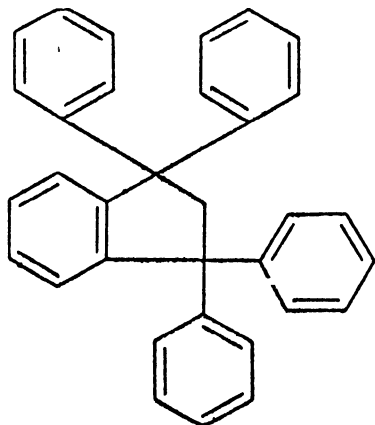
5,11-Di-*p*-tolynaphthacene

M. P., °C
335–336³⁶

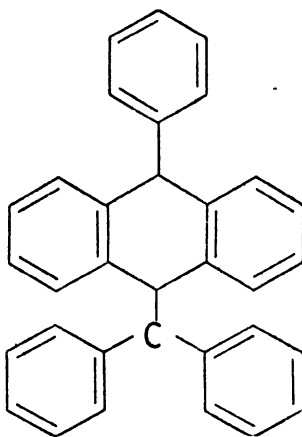
***x,x*-Dibenzylchrysene (a)**

M. P., °C
254²³

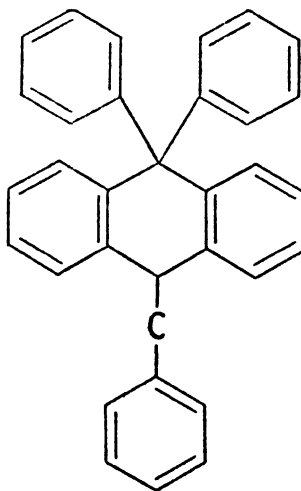
(a) The structure of this compound was not clearly defined in the literature.

 $C_{33}H_{26}$
1,1,3,3-Tetraphenylindane

M. P., °C
191–192³⁰

9-Phenyl-10-benzhydryl-9,10-dihydroanthracene

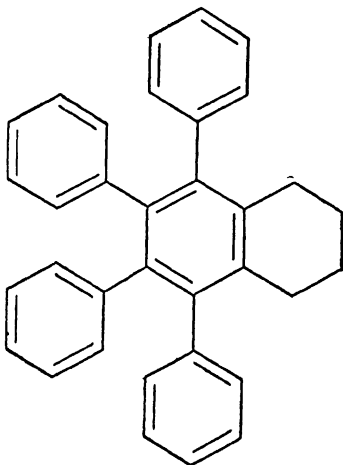
M. P., °C
217⁵

9,9-Diphenyl-10-benzyl-9,10-dihydroanthracene

M. P., °C
192⁷



5,6,7,8-Tetraphenyl-1,2,3,4-tetrahydronaphthalene



M. P., °C
271-272¹⁹

x,x-Diphenyl-x₆-hexahydronaphthalene (a)

M. P., °C
252¹

- (a) The structure of this compound was not clearly defined in the literature, but the phenyl groups are probably in the 6- and 13-positions.



Tetraindene (a)

M. P., °C
109-110¹⁰

- (a) The structure of this compound was not clearly defined in the literature.

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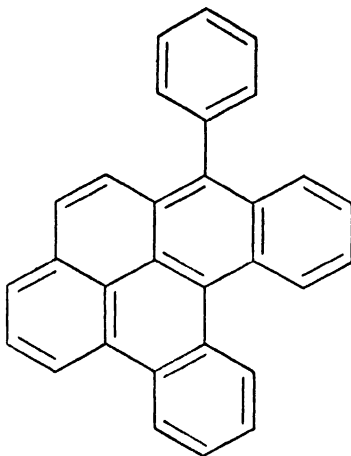
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**XIX. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-42}**

XIX. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-42}

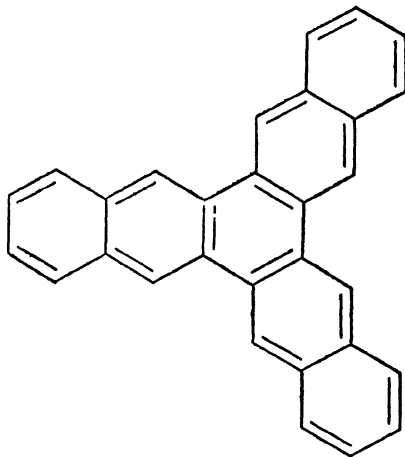
$C_{30}H_{18}$

2,3,4,5-Dibenzo-1-phenylpyrene



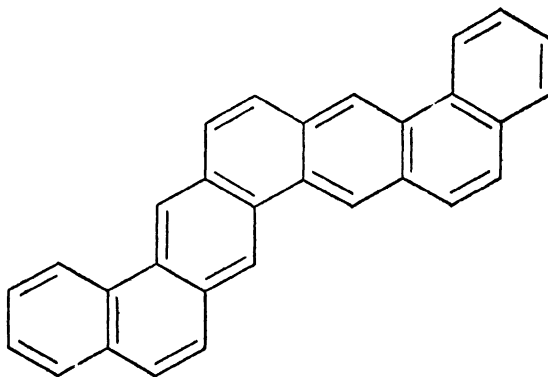
M. P., °C
242-243¹¹

1,2,3,4-Di-(3',2'-naphtho)-anthracene



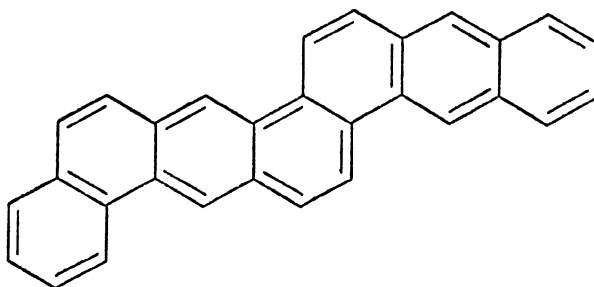
M. P., °C
392¹⁹
390¹⁹
388¹⁹
387¹⁹

1,2-Benzo-5,6-(2',3'-phenanthro)-anthracene



M. P., °C
398-399¹⁴

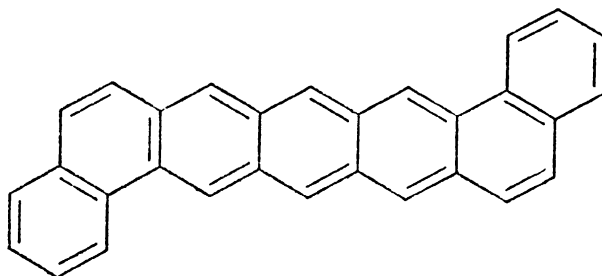
**2,3-Benzo-8,9-(4',3'-naphtho)-
chrysene**



M. P., °C 435-440 (a)¹⁶

(a) This compound melts with decomposition.

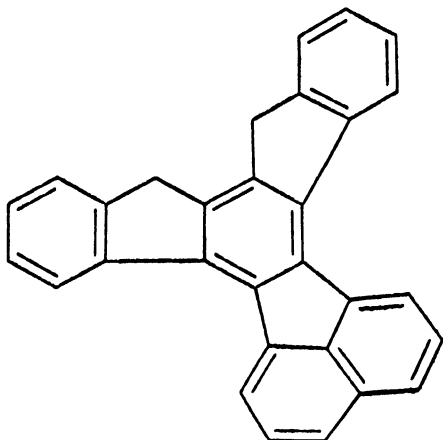
1,2,8,9-Dibenzopentacene



M. P., °C 410 (a)¹³

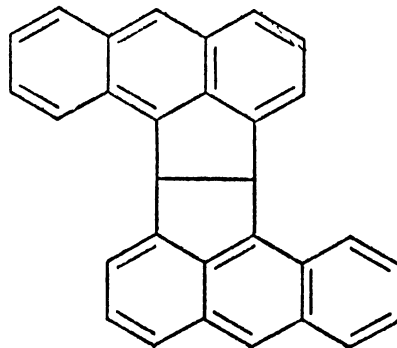
(a) This compound melts with decomposition.

**1,2-(2',3'-Indo)-3,4-(2',1'-ace-
naphtho)-fluorene**



M. P., °C
299¹⁷

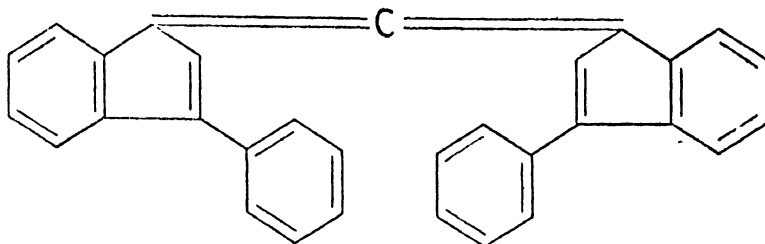
**1,2-[2',1'-(3,4'-Benzoacenaphtheno)]-
3,4-benzoacenaphthene**



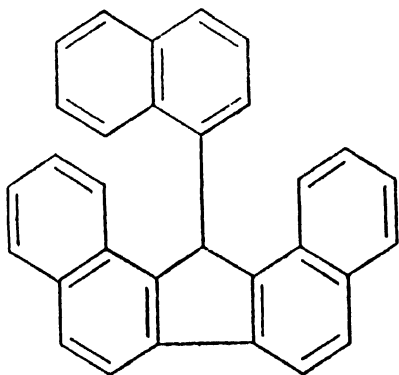
M. P., °C
349¹²



Di-(3-phenylindenylidene)-methane



M. P., °C
205-206⁷

1,2,7,8-Dibenzo-9-(1'-naphthyl)-
fluorene

M. P., °C
191^{8, 9}

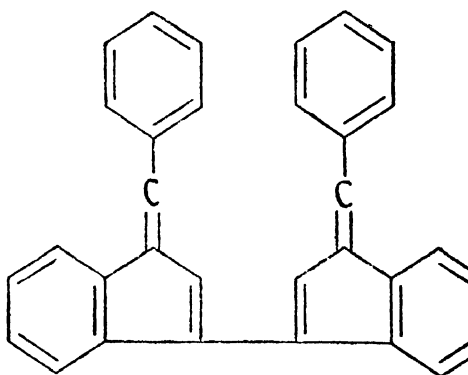
2,3,6,7-Dibenzo-x-(2'-naphthyl)-
fluorene (a)

M. P., °C
235-237 (in carbon dioxide)¹⁰

(a) The structure of this compound was not clearly defined in the literature.



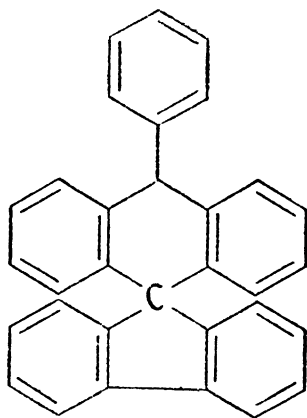
Bi-3,3'-(1-Benzylideneindenyl)



M. P., °C
217.5²¹

This series continued on next page

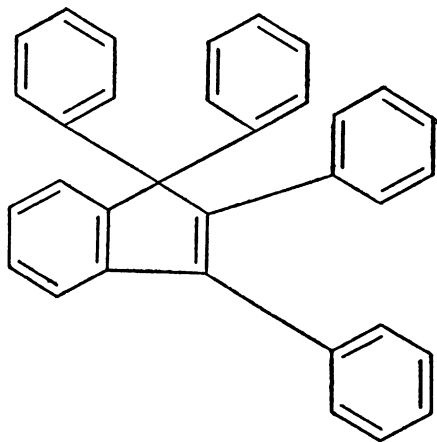
Spiro[9-phenyl-9,10-dihydroanthracene-10,9'-fluorene]



M. P., °C
267–268¹⁵

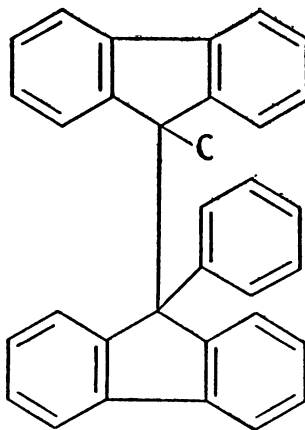


1,1,2,3-Tetraphenylindene



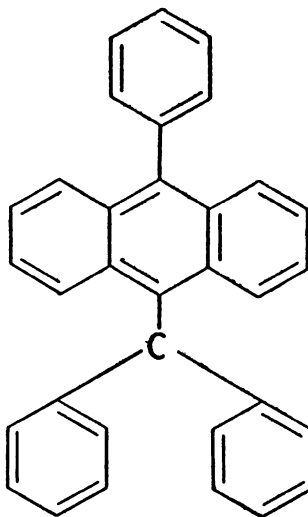
M. P., °C
149–150¹⁸

9-Phenyl-9'-methyl-9,9'-b'fluorenyl



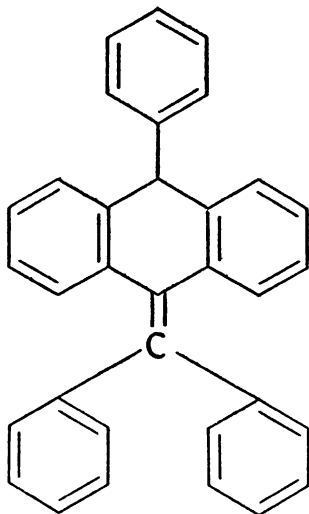
M. P., °C
161²²

9-Phenyl-10-benzhydrylanthracene



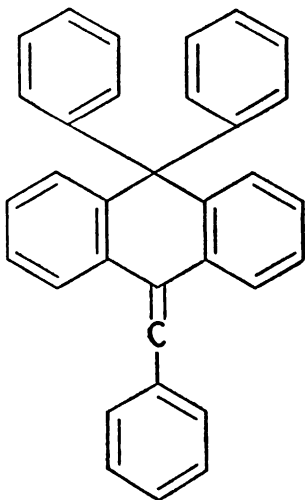
M. P., °C
154–155⁴

9-Phenyl-10-benzhydrylidene-9,10-dihydroanthracene



M. P., °C
218⁴

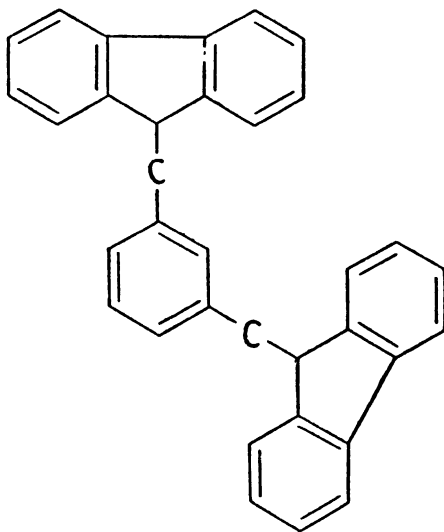
9,9-Diphenyl-10-benzylidene-9,10-dihydroanthracene



M. P., °C
254-255²
249⁶

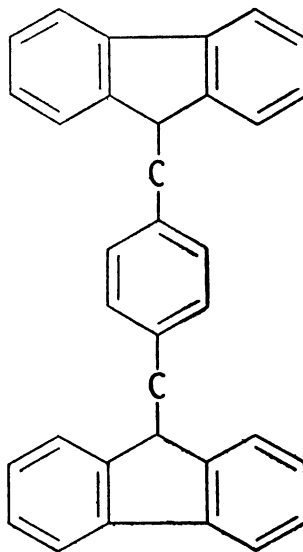
$C_{34}H_{26}$

1,3-Di-(9'-fluorylmethyl)-benzene

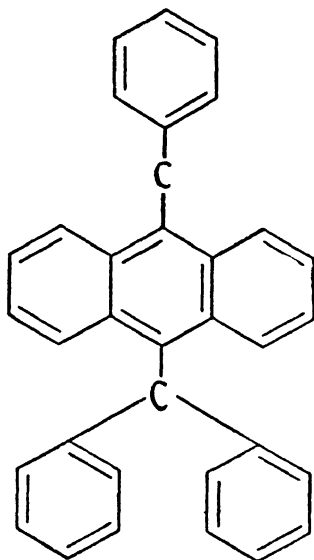


M. P., °C
119-120²⁰

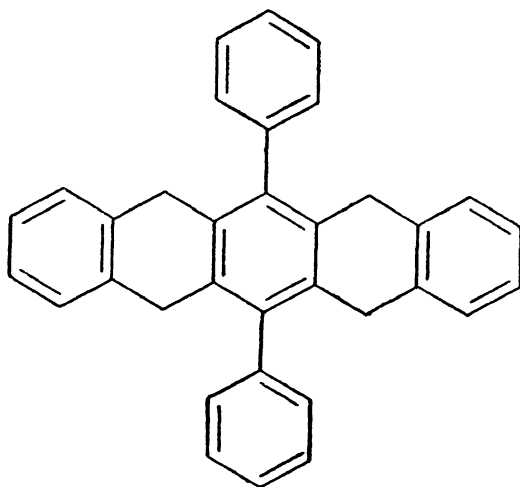
1,4-Di-(9'-fluorylmethyl)-benzene



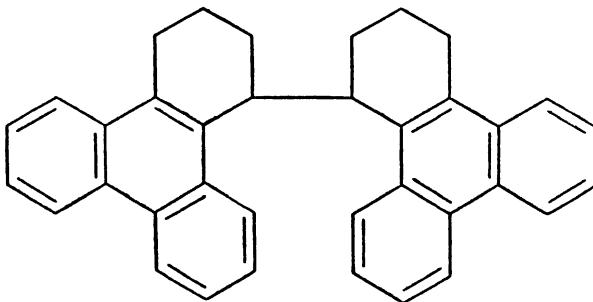
M. P., °C
239-240²⁰

9-Benzyl-10-benzhydrylanthracene*This series continued on next page*

M. P., °C
236¹

6,13-Diphenyl-5,7,12,14-tetrahydro-pentacene

M. P., °C
329-331¹

4,4'-Bi-(1,2,3,4-tetrahydrotri-
phenyl'enyl)

M. P., °C
300⁵

*References on Polynuclear Aromatics of
Empirical Formula C_nH_{2n-12}*

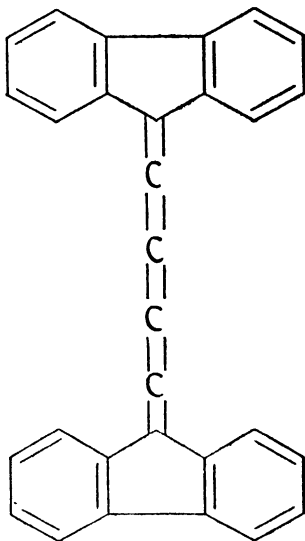
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**XX. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-4}**

XX. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-44}

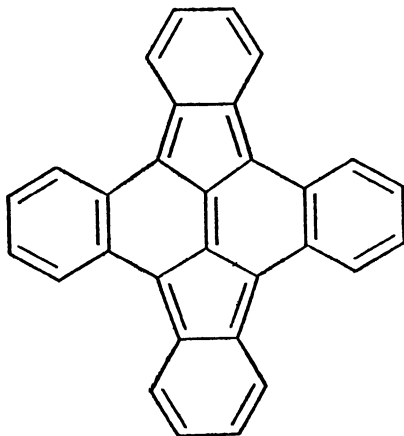
$C_{30}H_{16}$

1,4-Di-(9'fluorylidene)-butatriene



M. P., °C
441-442⁹

Diindo-[3,2,1-fg,3',2',1'-op]-
naphthacene
(Diphenylenerubene)

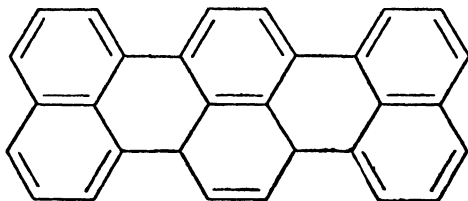


M. P., °C
465^{3, 5}

Additional Data
Sublimation Temp. (°C)
270-275 0.1 mm⁵

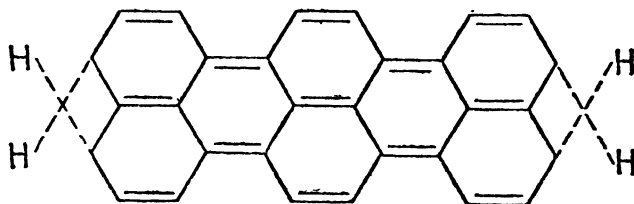
This series continued on next page

Dinaphtho-[1,8-ab,1',8'-hi]-pyrene
(Chalcacene) (a)



M. P., °C
358-360^{6, 7}

(Rhodacene) (b)

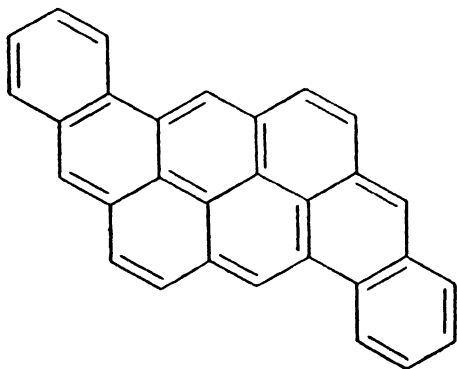


M. P., °C
338-340⁶

(a) This name is given to the form of the compound having a benzenoid structure.

(b) This name is given to the form of the compound having a quinoid structure.

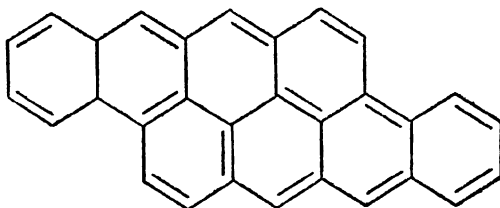
Dinaphtho-[3,2,1-cd,3',2',1'-jk]-pyrene



M. P., °C
372-373⁴

This series continued on next page

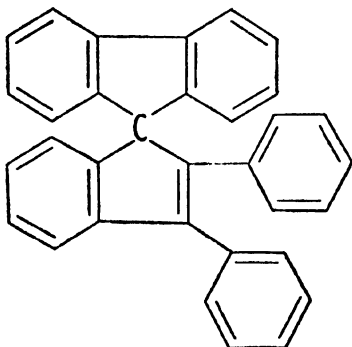
**Dinaphtho-[4,3,2-cd,4',3',2'-jk]-
pyrene**



M. P., °C 382-390⁴

$C_{33}H_{22}$

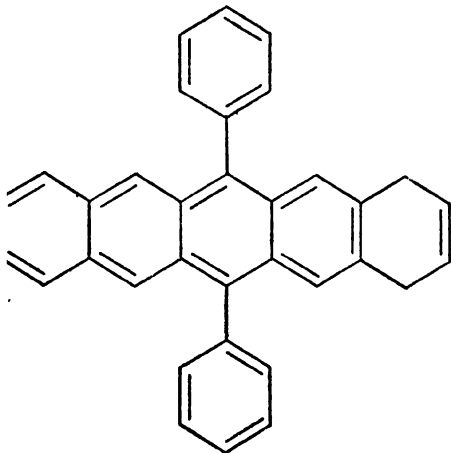
**Spiro [2,3-diphenylindene-1,9'-
fluorene]**



M. P., °C 174-175³

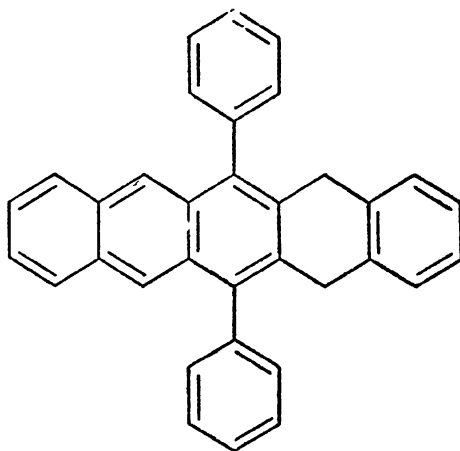
$C_{31}H_{24}$

6,13-Diphenyl-1,4-dihydropentacene



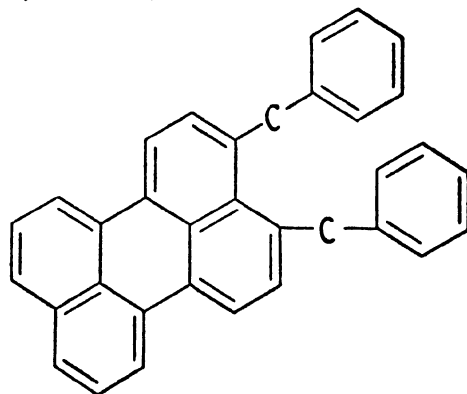
. P., °C 295¹

6,13-Diphenyl-5,14-dihydropentacene

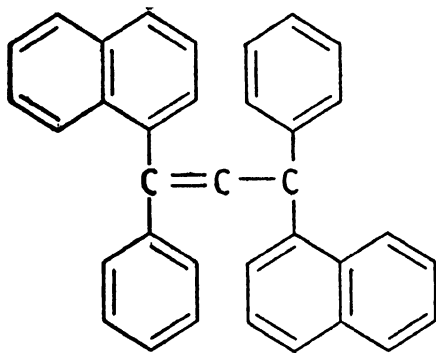
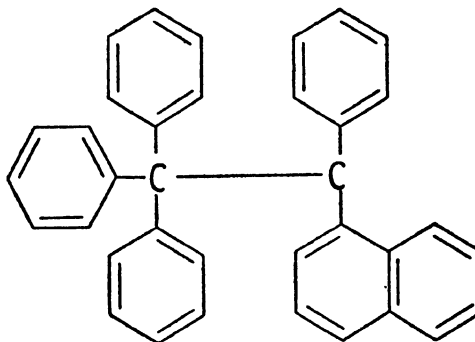


M. P., °C
217-248¹

3,4-Dibenzylperylene



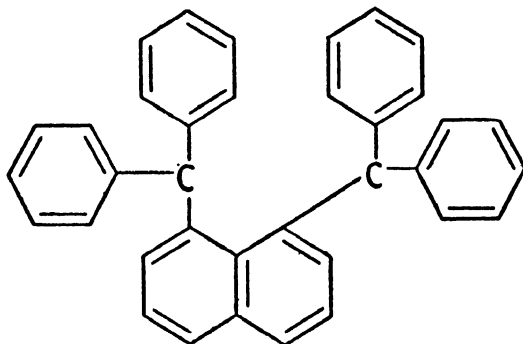
M. P., °C 329-330¹³

C₃₈H₂₆1,3-Diphenyl-1,3-di-(1'-naphthyl)-
propene-1M. P., °C
167-169¹¹1,1,1,2-Tetraphenyl-2-(1'-naphthyl)-
ethaneM. P., °C
194-196 (in nitrogen)²
184-194 (in air)²*References on Polynuclear Aromatics of
Empirical Formula C_nH_{2n-4}*

1. Allen, C. F. H., and A. Bell, J. Am. Chem. Soc. **64**, 1253 1942.
2. Bachmann, W. E., J. Am. Chem. Soc. **55**, 2135 1939.

C₃₆H₂₈

1,8-Dibenzhydrylnaphthalene

M. P., °C
243¹²

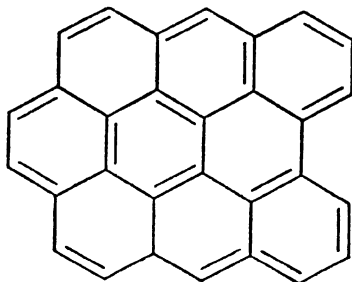
3. Badoche, M., *Ann. chim.* [10] **20**, 200 **1933**.
4. Clar, E., *Ber.* **76**, 328 **1943**.
5. Dufraisse, C., and R. Girard, *Bull. soc. chim.* [5] **1**, 1359 **1934**.
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8. Koelsch, C. F., *J. Am. Chem. Soc.* **54**, 3384 **1932**.
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10. Kuhn, R., and K. Wallenfels, *Ber.* **71**, 1510 **1938**.
11. Maitland, P., and W. H. Mills, *J. Chem. Soc.* **1936**, 987.
12. Wittig, G., and H. Petri, *Ber.* **68**, 924 **1935**.
13. Zinke, A., and O. Benndorf, *Monatsh.* **56**, 153 **1930**; *C.A.* **25**, 292 **1931**; *Chem. Zentr.* **1931**, I, 276.

**XXI. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-46}**

XXI. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-46}

$C_{30}H_{14}$

Dibenzo-[bc,ef]-coronene



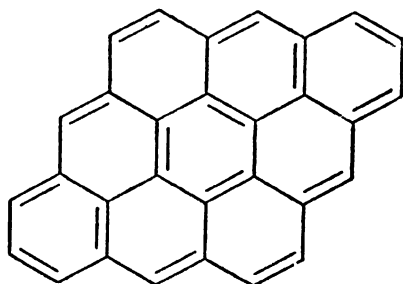
Additional Data

Sublimation Temp. ($^{\circ}\text{C}$)

ca 500

1 mm¹³

Dibenzo-[bc,kl]-coronene



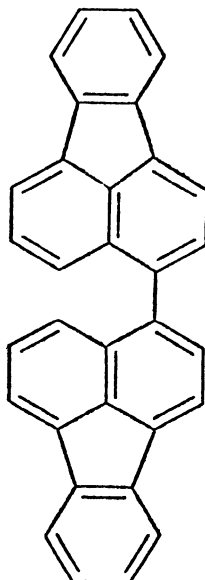
Additional Data

Sublimation Temp. ($^{\circ}\text{C}$)

450-500¹²

$C_{32}H_{18}$

4,4'-Bi-(1,2-benzoacenaphthyl)

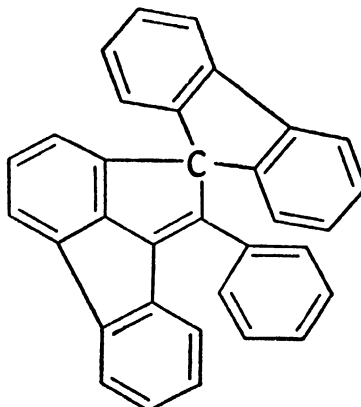


M. P., $^{\circ}\text{C}$

327-329²³

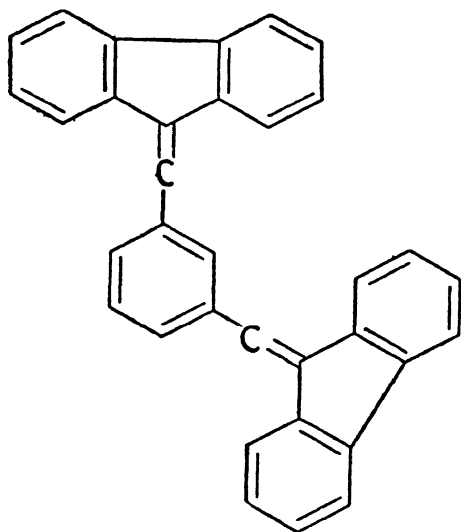
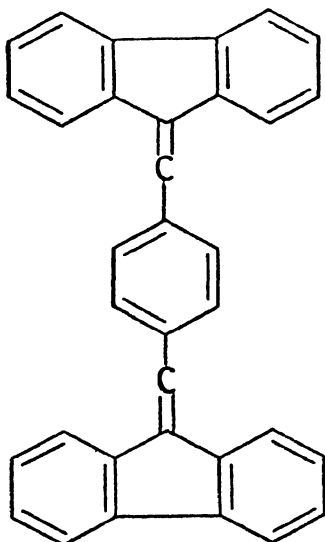
$C_{23}H_{20}$

Spiro[indo-[3',2',1'-cd]-2-phenylin-
dene-1,9''-fluorene]

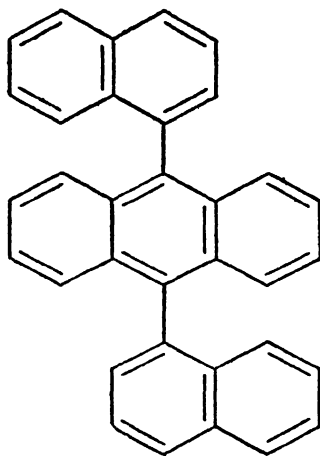


M. P., $^{\circ}\text{C}$

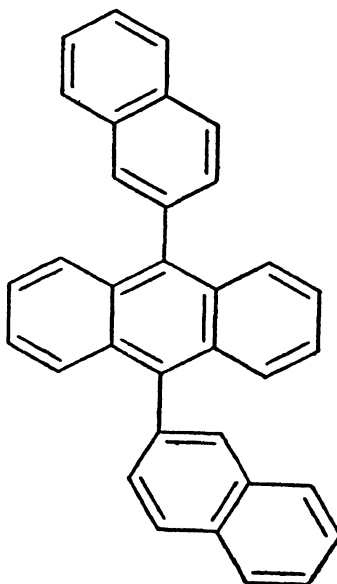
196-197⁹

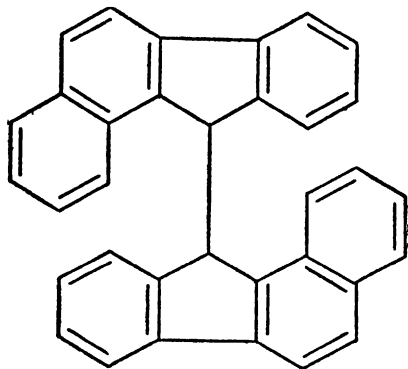
C₃₄H₂₂1,3-Di-(9'-fluorylidenemethyl)-
benzeneM. P., °C
178-179¹⁶1,4-Di-(9'-fluorylidenemethyl)-
benzeneM. P., °C
209-210¹⁵

9,10-Di-(1'-naphthyl)-anthracene

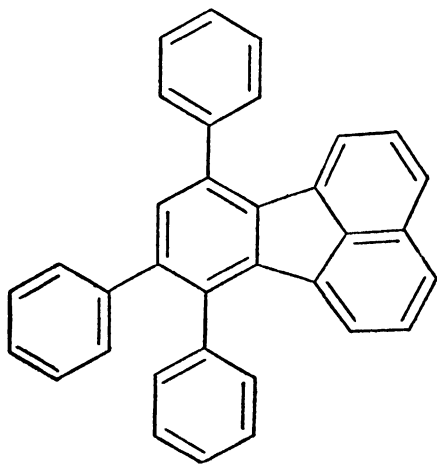
M. P., °C
430-431²⁴
430²³

9,10-Di-(2'-naphthyl)-anthracene

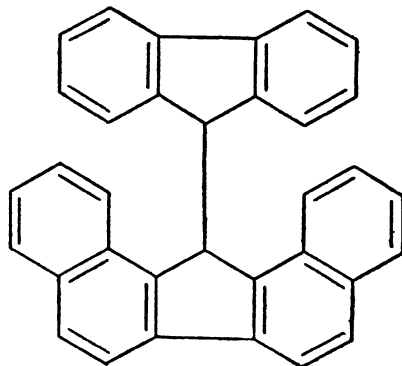
M. P., °C
379²³
378-379²⁴

Bi-9,9'-(1,2-benzofluoryl)

M. P., °C
 257²⁰
 221²¹

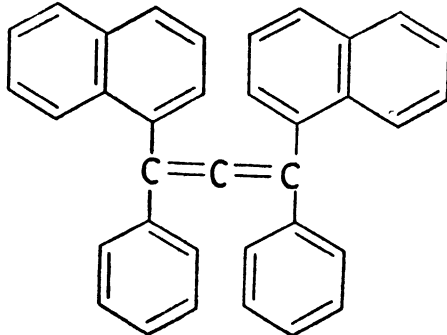
2,3-(2',1'-Acenaphtho)-1,4,5-triphenylbenzene

M. P., °C
 195-196⁷

1,2,7,8-Dibenzo-9-(9'-fluoryl)-fluorene (a)

M. P., °C
 270^{20, 21}

(a) The structure of this compound was not clearly defined in the literature.

 $C_{36}H_{24}$ **1,3-Diphenyl-1,3-di-(1'-naphthyl)-propadiene**

M. P., °C
 242-244 (a)^{10, 11}
 240⁵
 158-159 (b) (c)^{10, 11}

Additional Data

$[\alpha]_{D}^{17} = +437^\circ$ (b)^{10, 11}
 $[\alpha]_{D}^{17} = -438^\circ$ (c)^{10, 11}

(a) This constant was determined on the *dl*-form of the compound.

- (b) This constant was determined on the *d*-form of the compound.
 (c) This constant was determined on the *l*-form of the compound.

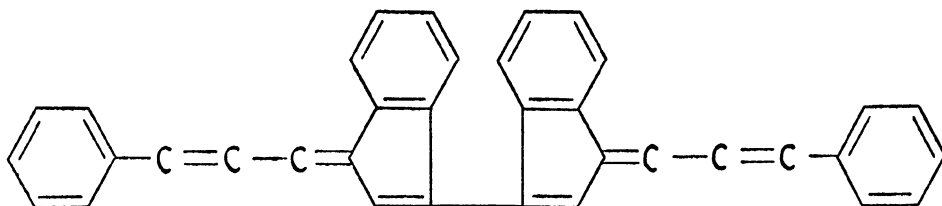
Di-(*x*, *x'*-phenanthryl)-phenylmethane
 (a)

M. P., °C
 165³

- (a) The structure of this compound was not clearly defined in the literature.

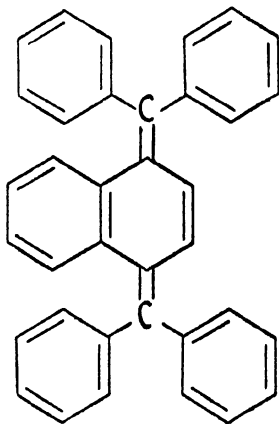
C₃₆H₂₆

Bi-3,3'-[1-(3''-phenylpropen-2''-ylidene)-indenyl]



M. P., °C
 251¹⁹

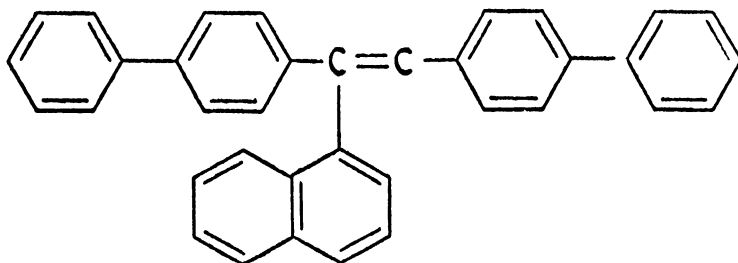
1,4-Dibenzhydrylidene-1,4-dihydronaphthalene



M. P., °C
 262-263¹⁷

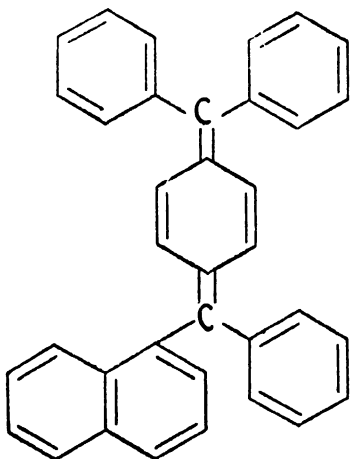
This series continued on next page

**1-(1'-Naphthyl)1,2-di-*p*-biphenyl-
ylethene**



M. P., °C
209-214¹⁴

**1-Benzhydrylidene-4-(1'-naphthyl-
phenylmethylene)-cyclohexadiene
-2,5**



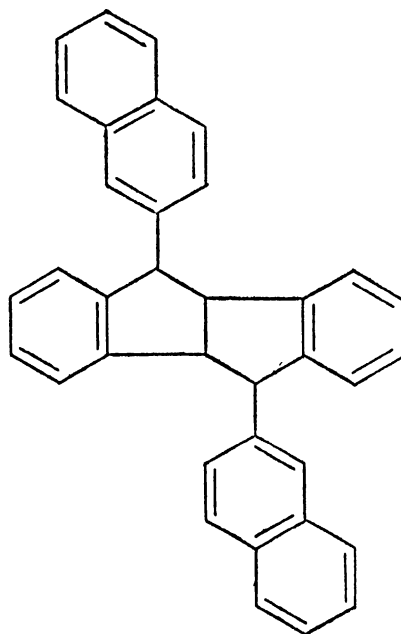
M. P., °C
240-241 (in carbon dioxide)⁴
238-239 (in carbon dioxide)¹

**x-Benzhydrylidene-x,x-diphenyl-
x,x-benzocycloheptadiene-x,x (a)**

M. P., °C
181-182¹⁸

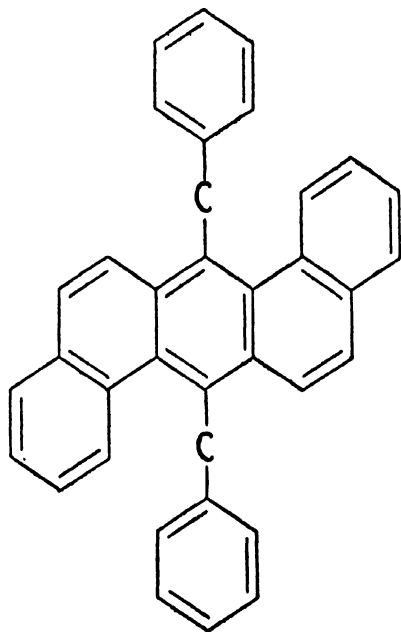
(a) The structure of this compound was not clearly defined in the literature.

**2,3,6,7-Dibenzo-4,8-di-(2'-naphthyl)-
bicyclo-[3,3,0]-octane**



M. P., °C
225³

1,2,5,6-Dibenzo-9,10-dibenzylanthracene



M. P., °C
195–201 (a)⁶

(a) This compound melts with decomposition.

x,x,x-Triphenyl-x,x-dihydronaphthalene (a)

M. P., °C
208–209²

(a) The structure of this compound was not clearly defined in the literature.

References on Polynuclear Aromatics of Empirical Formula C_nH_{2n-10}

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2. Badoche, M., *Bull. soc. chim.* [5] **5**, 164 **1938**.
3. Brand, K., and K. Trebing, *Ber.* **56**, 2545 **1923**.
4. Chichibabin, A. E., *Ber.* **41**, 2770 **1908**.
5. Clemo, G. R., R. Raper, and A. C. Robson, *J. Chem. Soc.* **1939**, 431.
6. Cook, J. W., *J. Chem. Soc.* **1931**, 489.
7. Dilthey, W., S. Henkels, and A. Schaefer, *Ber.* **71**, 974 **1938**.
8. Frankforter, G., and W. Kritchevsky, *J. Am. Chem. Soc.* **37**, 385 **1915**.
9. Koelsch, C. F., *J. Am. Chem. Soc.* **54**, 4744 **1932**.
10. Maitland, P., and W. H. Mills, *J. Chem. Soc.* **1936**, 987.
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12. Scholl, R., and K. Meyer, *Ber.* **65**, 902 **1932**.
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14. Shilov, E. A., and F. K. Yudin, *J. Gen. Chem. (U.S.S.R.)* **9**, 167 **1939**; *C. A.* **33**, 6283 **1939**.
15. Sieglitz, A., *Ber.* **52**, 1513 **1919**.
16. Sieglitz, A., *Ber.* **53**, 1232 **1920**.
17. Staudinger, H., *Ber.* **41**, 1355 **1908**.
18. Staudinger, H., and H. Kon, *Ann.* **384**, 38 **1911**.
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20. Vansheidt, A., *Ber.* **59**, 2092 **1926**.
21. Vansheidt, A. A., *J. Russ. Phys. Chem. Soc.* **58**, 69 **1926**; *C. A.* **21**, 581 **1927**; *Chem. Zentr.* **1926**, II, 24, 28.
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23. Willemart, A., *Bull. soc. chim.* [5] **4**, 357 **1937**.
24. Willemart, A., *Compt. rend.* **201**, 1201 **1935**.

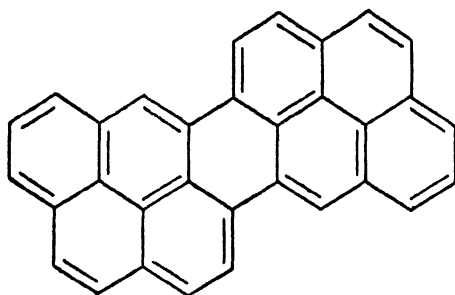
XXII. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-48}

XXII. POLYNUCLEAR AROMATICS OF EMPIRICAL

FORMULA C_nH_{2n-48}

$C_{32}H_{16}$

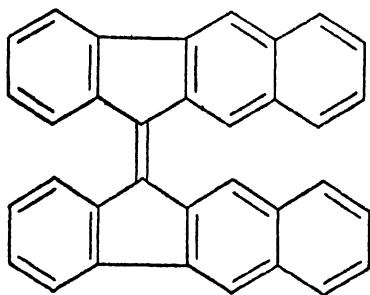
**Dinaphtho-[2,1,8-cde,2',1',8'-lmn]-
perylene**



M. P., °C
213-214¹⁷

$C_{34}H_{20}$

9,9'-Bi-(2,3-benzofluorylidene)



M. P., °C
232¹⁸

***sym*-Di- α -naphthylenediphenylene-
ethene (a)**

M. P., °C
317-318¹⁶

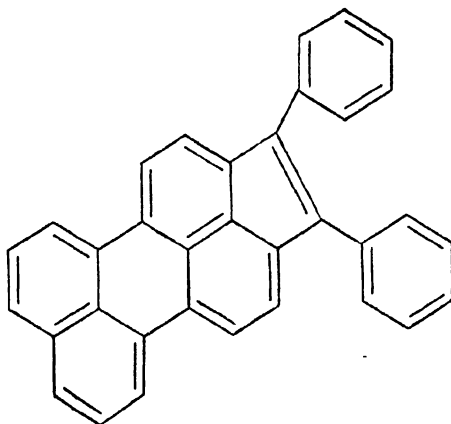
(a) The structure of this compound was not clearly defined in the literature.

***unsym*-Di- α -naphthylenediphenylene-
ethene (a)**

M. P., °C
315¹⁶

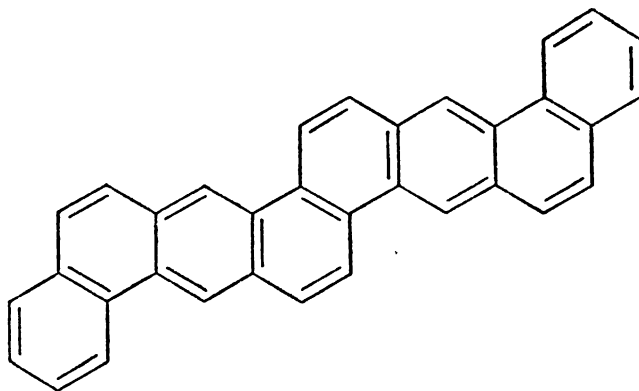
(a) The structure of this compound was not clearly defined in the literature.

**(4,5-Diphenylcyclopenten-4-o)-[cd]-
perylene**

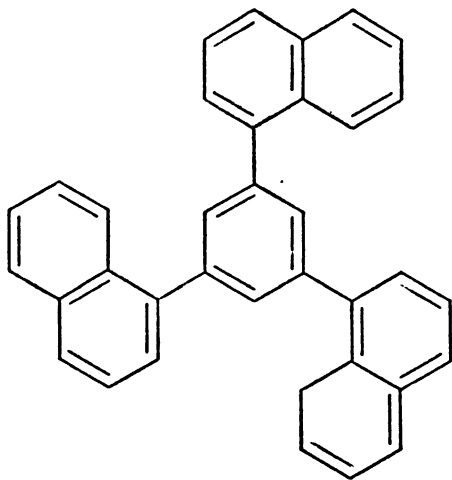


M. P., °C
315-316²¹

This series continued on next page

2,3,8,9-Di-(4',3'-naphtho)-chrysene

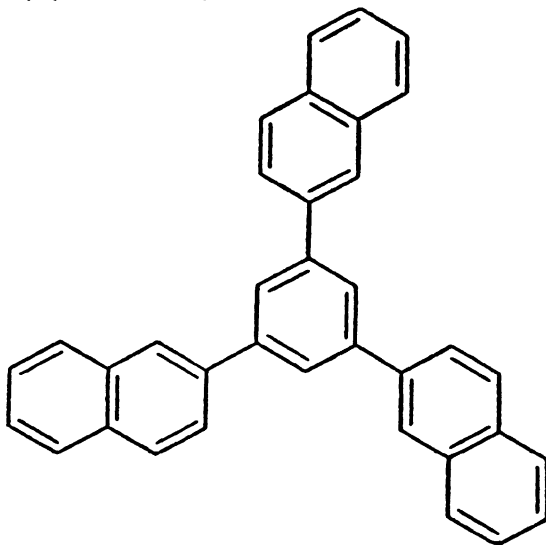
M. P., °C
500¹⁰

 $C_{36}H_{24}$ **1,3,5-Tri-(1'-naphthyl)-benzene**

M. P., °C
190.5-191⁵

This series continued on next page

1,3,5-Tri-(2'-naphthyl)-benzene



M. P., °C
234-235⁵

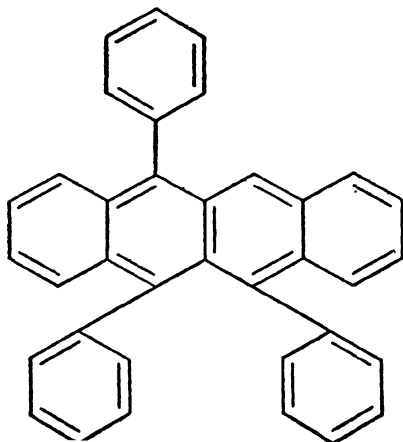
x,x-Di-*p*-biphenylacenaphthylene

(a)

M. P., °C

189.5-190.5¹

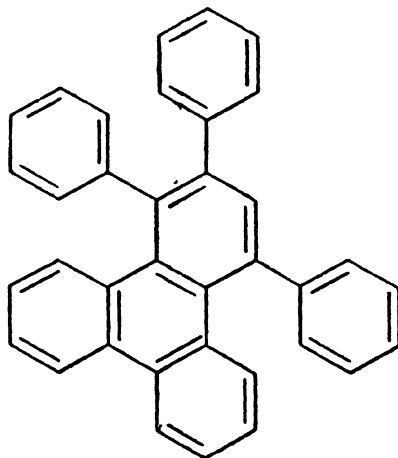
(a) The structure of this compound was not clearly defined in the literature.

5,6,11-Triphenylnaphthacene (a)
(Triphenylrubene)

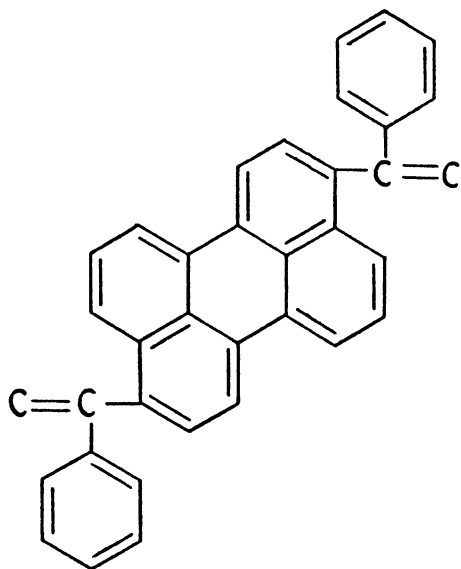
M. P., °C

236-237^{3, 4, 7, 9}

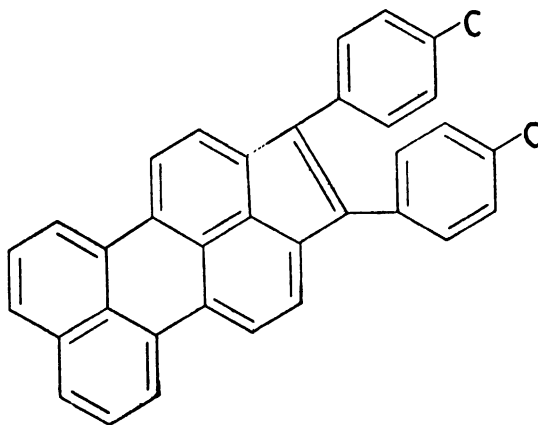
(a) This compound was named Di-phenylrubrene in reference 7.

1,2,4-Triphenyltriphenylene

M. P., °C
250⁶

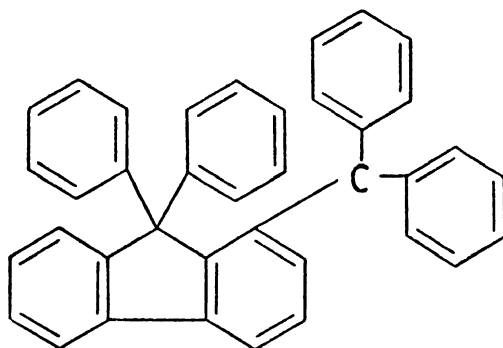
3,9-Di-(1'-phenethenyl)-perylene

M. P., °C
257-258²¹

(4,5-Di-*p*-tolylcyclopenten-4-o)-[cd]-perylene

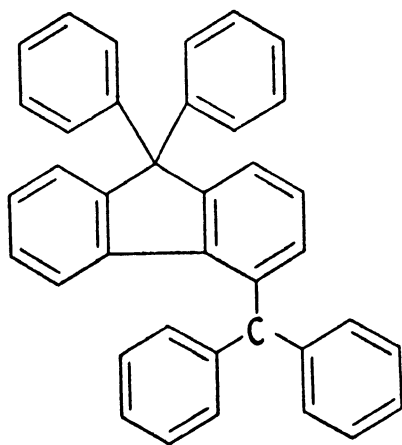
M. P., °C
326.5-327.5¹²

1-Benzhydryl-9,9-diphenylfluorene



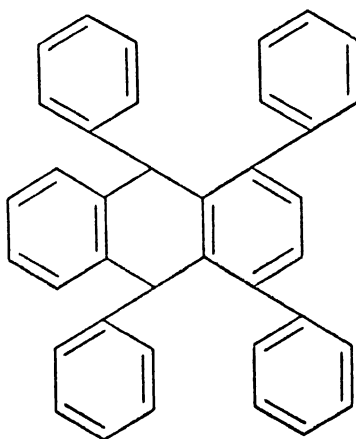
M. P., °C
219–220¹⁴

4-Benzhydryl-9,9-diphenylfluorene



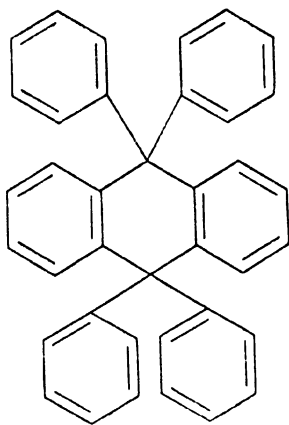
M. P., °C
219.5–221¹⁹
219–220¹⁴

1,4,9,10-Tetraphenyl-9,10-dihydroanthracene

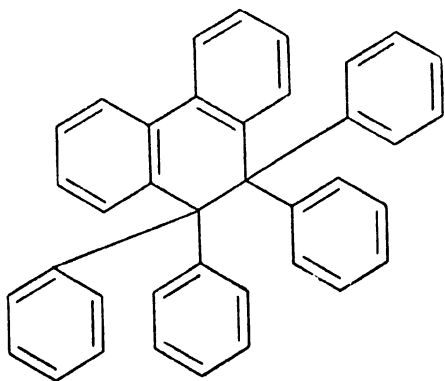


M. P., °C
217 (a)¹⁸
205 (a)¹⁸

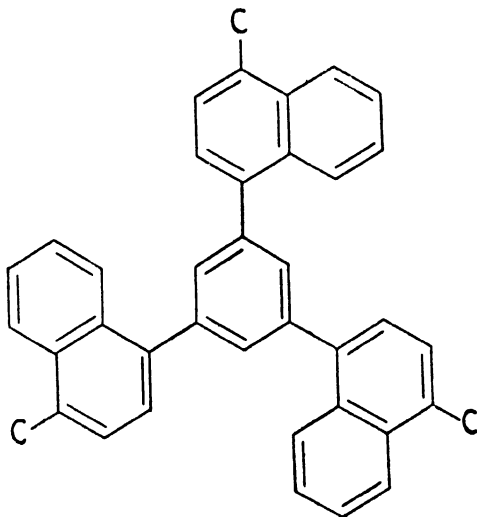
(a) These constants were determined
on stereoisomers.

9,9,10,10-Tetraphenyl-9,10-dihydroanthracene

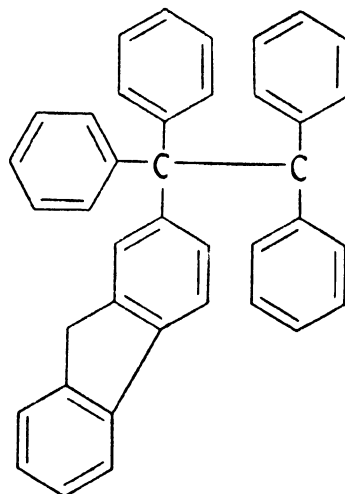
M. P., °C
159^{13, 20}

9,9,10,10-Tetraphenyl-9,10-dihydrophenanthrene

M. P., °C
339.5-341¹⁹

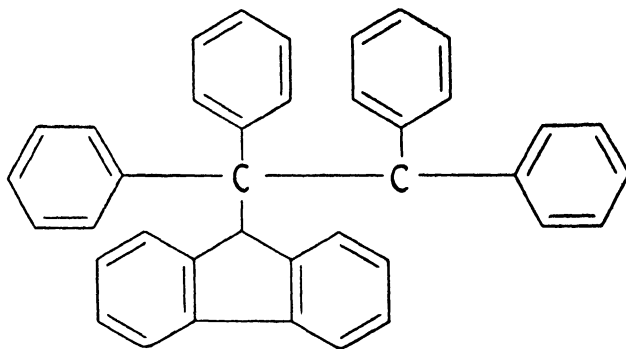
 $C_{39}H_{30}$ **1,3,5-Tri-[1'-(4'-methylnaphthyl)]-benzene**

M. P., °C
185⁸

1,1,2,2-Tetraphenyl-1-(2'-fluoryl)-ethane

M. P., °C
187-190 (in nitrogen)²
168-176³

1,1,2,2-Tetraphenyl-1-(9'-fluoryl)-ethane



M. P., °C
205¹¹

*References on Polynuclear Aromatics of
Empirical Formula C_nH_{2n-48}*

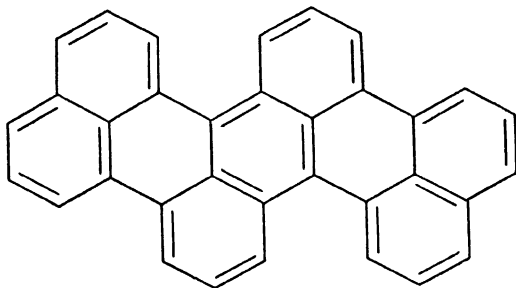
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XXIII. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA
 C_nH_{2n-50}

POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA C_nH_{2n-50}

$C_{34}H_{18}$

Tetrabenzo-[de,hi,op,st]-pentacene (a)

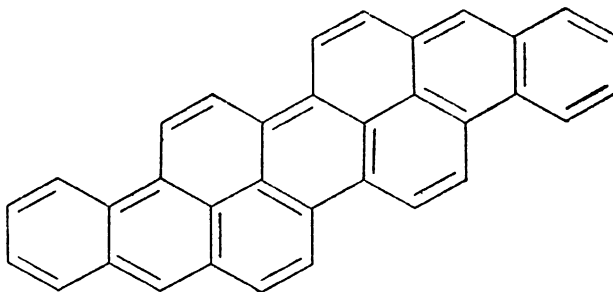


M. P., °C

580 (in sealed tube)⁸

- (a) This compound exists in solution with free valences in the 5a- and 12a-positions.

**Dinaphtho-[3,2,1-cd,3',2',1'-lm]-
perylene
(Isoviolanthrene)**



M. P., °C

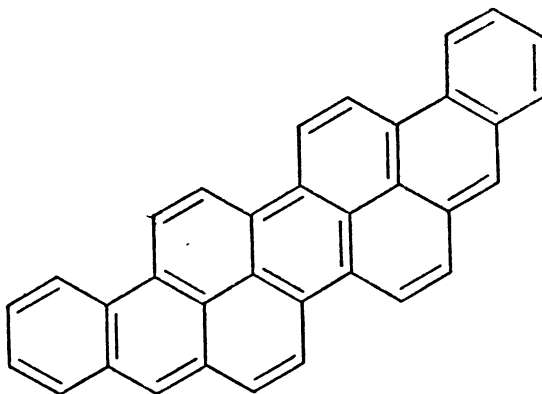
510⁷

Additional Data

Sublimation Temp. (°C)

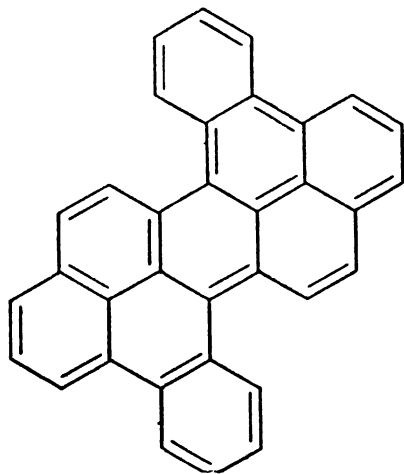
460 (in carbon dioxide)²⁸

**Dinaphtho-[4,3,2-cd,3',2',1'-lm]-
perylene**
(Violanthrene)



M. P., °C
478⁷

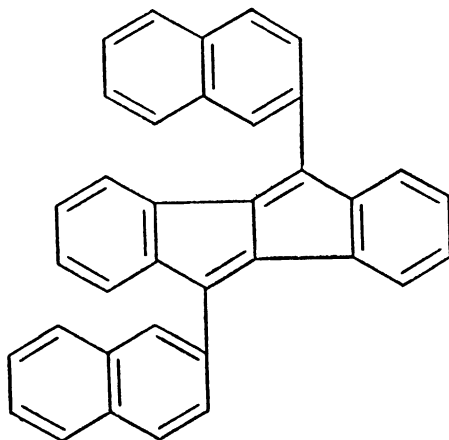
Tetrabenzo-[a,cd,j,lm]-perylene



M. P., °C
331-332⁷

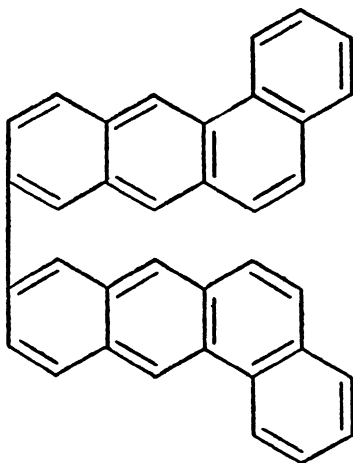
$C_{36}H_{22}$

**3,4,7,8-Dibenzo-2,6-di-(2'-naph-
thyl)-bicyclo-[3,3,0]-octadiene-
1,5**



M. P., °C
266⁶

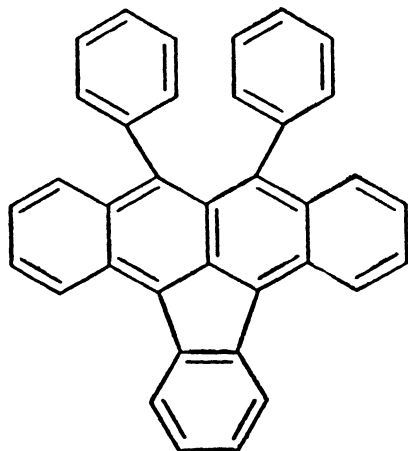
6,6'-Bi-(1,2-benzoanthryl) (a)



M. P., °C
310¹⁰

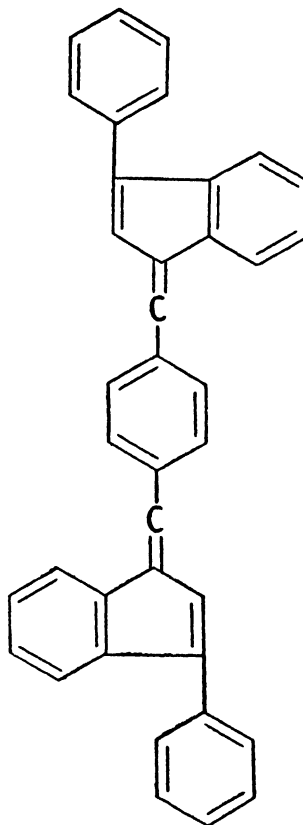
(a) The structure of this compound may be 7,7'-Bi-(1,2-benzoanthryl).

Indo-[3',2',1'-fg]-11,12-diphenyl-naphthacene
(Diphenylphenylenerubene)



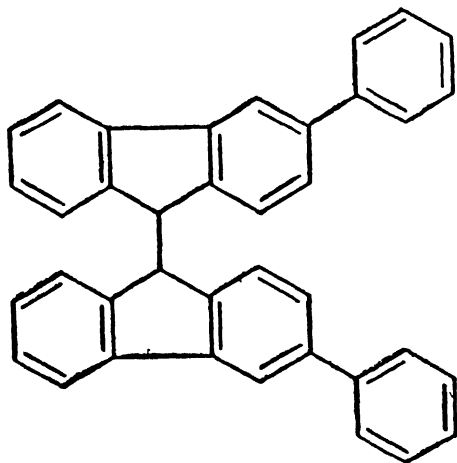
M. P., °C
270-271¹¹

1,4-Di-(3'-phenylindenylidenemethyl)-benzene

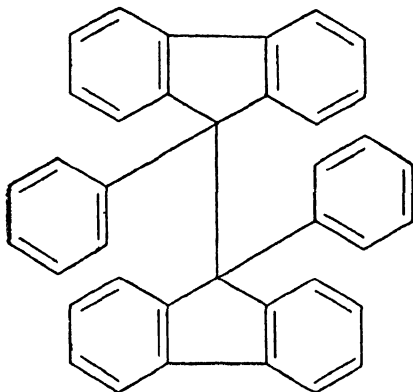


M. P., °C
231-232¹⁵

This series continued on next page

9,9'-Bi-(3-phenylfluoryl)

M. P., °C
190-193⁹

9,9'-Bi-(9-phenylfluoryl)

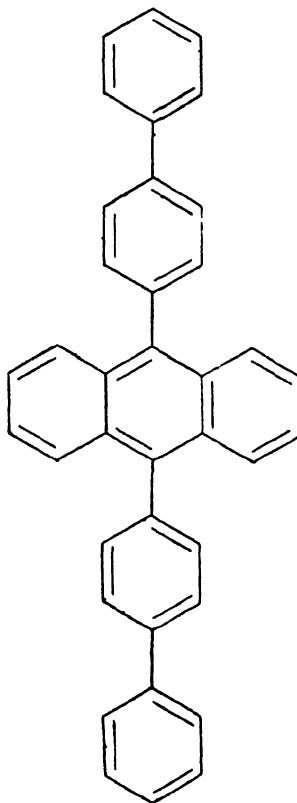
M. P., °C
256^{21, 22}
254¹⁹
248-250²⁰

D_4^{20}
1.266 0°²⁷

9,9'-Bi-(x-phenylfluoryl) (a)

M. P., °C
225⁸

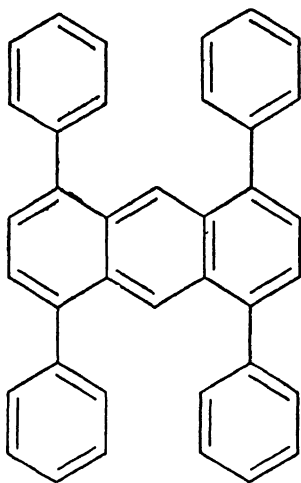
(a) The structure of this compound was not clearly defined in the literature.

9,10-Di-*p*-biphenylanthracene

M. P., °C
415¹²

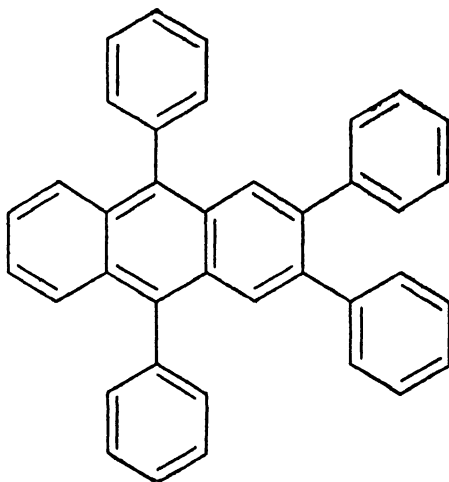
This series continued on next page

1,4,5,8-Tetraphenylanthracene



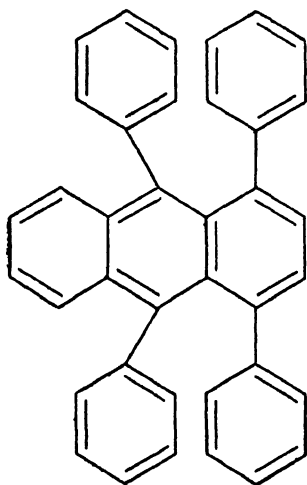
M. P., °C
370¹³

2,3,9,10-Tetraphenylanthracene



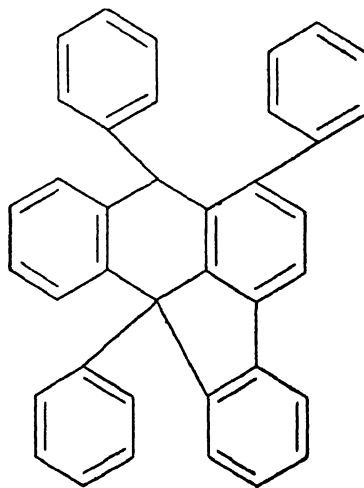
M. P., °C
324-325¹

1,4,9,10-Tetraphenylanthracene



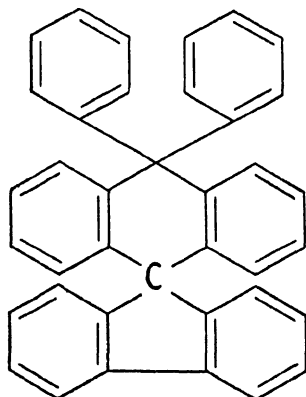
M. P., °C
205^{25, 26}
204²⁴

Indo-[3',2',1'-de]-1,9,10-triphenyl-9,10-dihydroanthracene



M. P., °C
322^{25, 26}

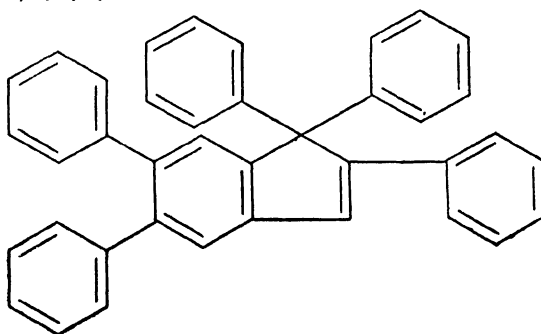
Spiro[9,9-diphenyl-9,10-dihydro-anthracene-10,9'-fluorene]



M. P., °C 363-364⁹

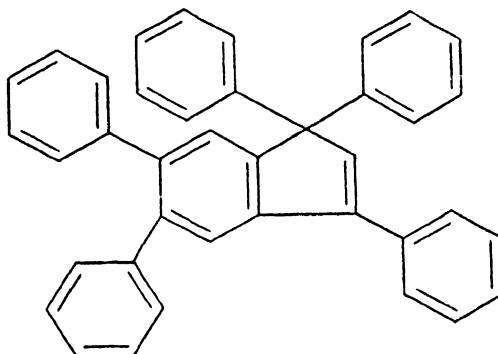
$C_{39}H_{28}$

1,1,2,5,6-Pentaphenylindene



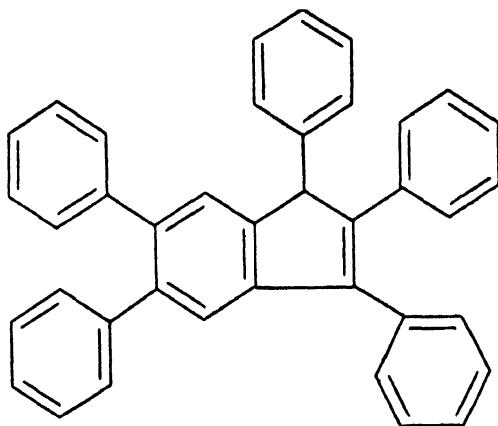
M. P., °C 222¹

1,1,3,5,6-Pentaphenylindene

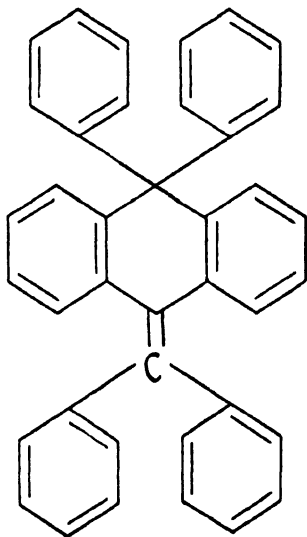


M. P., °C 227¹

1,2,3,5,6-Pentaphenylindene



M. P., °C
280¹

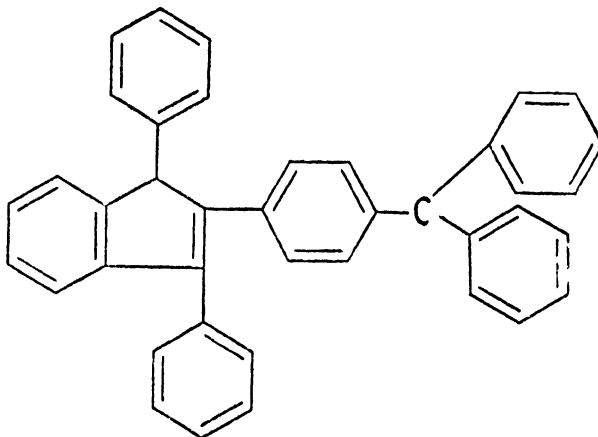
9,9-Diphenyl-10-benzhydrylidene-
9,10-dihydroanthracene

M. P., °C
286³
276⁴

This series continued on next page

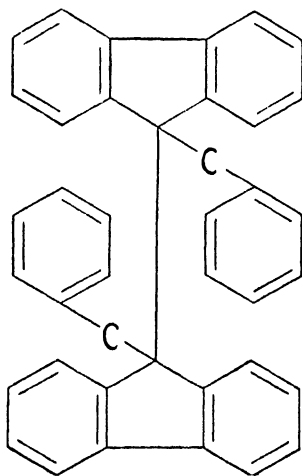
$C_{40}H_{30}$

1,3-Diphenyl-2-(4'-benzhydryl-phenyl)-indene



M. P., °C
173-175¹⁴

9,9'-Bi-(9-benzylfluoryl)



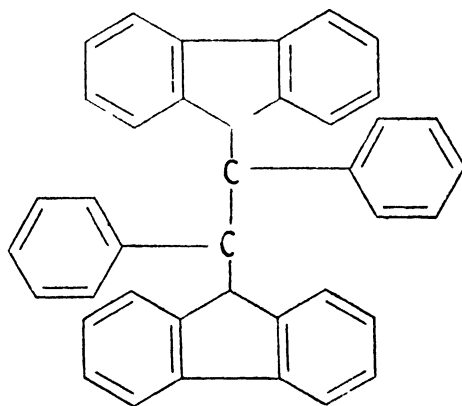
M. P., °C
203-203.5²³
203²²

x,x'-Bi-(**x-p**-tolylfluoryl) (a)

M. P., °C
216¹⁶

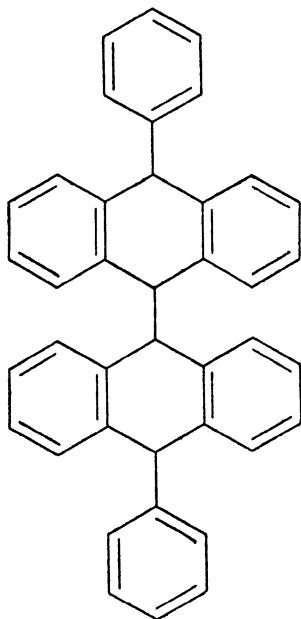
(a) The structure of this compound was not clearly defined in the literature.

1,2-Diphenyl-1,2-di-(9'-fluoryl)-ethane



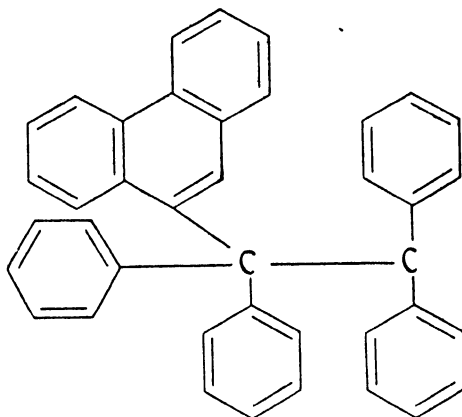
M. P., °C
321¹⁷

9,9'-Bi-(10-phenyl-9,10-dihydroanthryl)



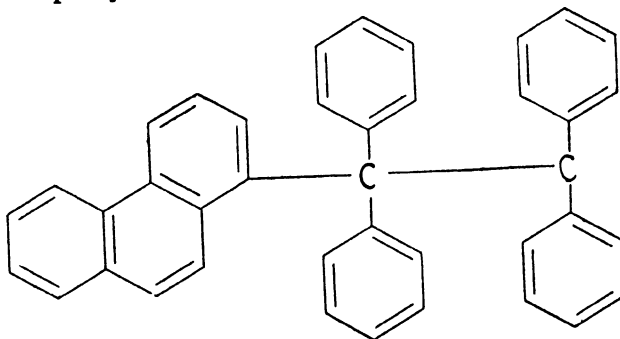
M. P., °C
260¹⁸

1-(9'-Phenanthryl)-1,1,2,2-tetra-phenylethane



M. P., °C
152-155 (in nitrogen)²
149-152 (in air)²

1-(1'-Phenanthryl)-1,1,2,2-tetra-phenylethane



M. P., °C
125-135 (a) (in vacuum)²
123-134 (a)²

(a) This compound melts with decomposition.

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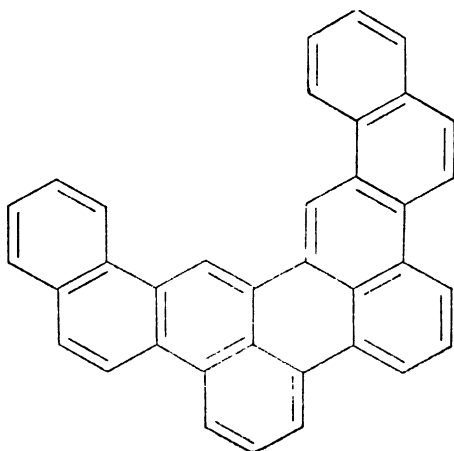
XXIV. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA
 C_nH_{2n-52}

XXIV. POLYNUCLEAR AROMATICS OF EMPIRICAL FORMULA

C_nH_{2n-52}

$C_{36}H_{20}$

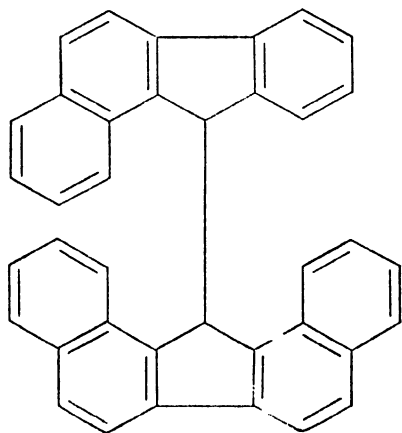
2,3-(4',3'-Naphtho)-10,11-(2',1'-naphtho)-perylene



M. P., °C
240³

$C_{38}H_{24}$

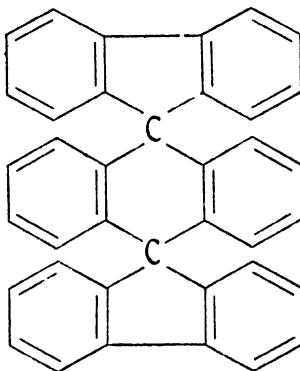
1,2,7,8-Dibenzo-9-[9'-(1',2'-benzofluoryl)]-fluorene (a)



M. P., °C
267^{5, 6}

(a) The structure of this compound was not clearly defined in the literature.

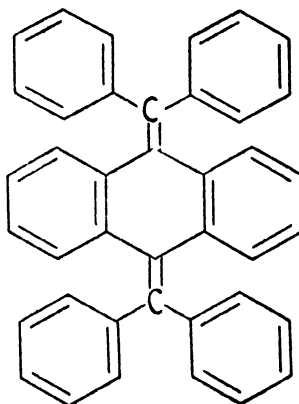
Dispiro[fluorene-9,9'-(9',10'-dihydroanthracene)-10',9''-fluorene]



M. P., °C
471-474¹

$C_{40}H_{28}$

9,10-Dibenzylidene-9,10-dihydroanthracene



M. P., °C
305²
302-303⁴

*References on Polynuclear Aromatics of
Empirical Formula C_nH_{2n-52}*

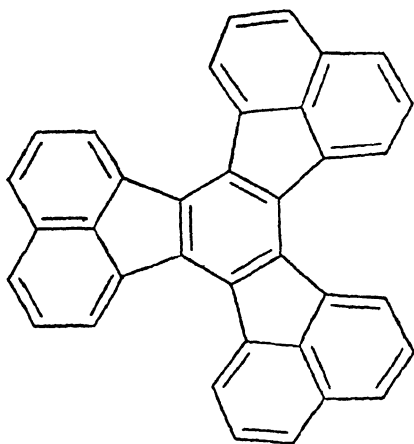
- | | |
|--|--|
| 1. Clarkson, R. G., and M. Gomberg, J. Am. Chem. Soc. 52 , 2881 1930. | 3. Schiedt, B., Ber. 71 , 1248 1938. |
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XXV. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-54}

XXV. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-54}



1,2,3,4,5,6-Tri-(2',1'-acenaphtho)-
benzene
(Decacycene)



M. P., °C

388

390²⁴

389.5^{16, 17}

387^{9, 10, 11, 12, 13}



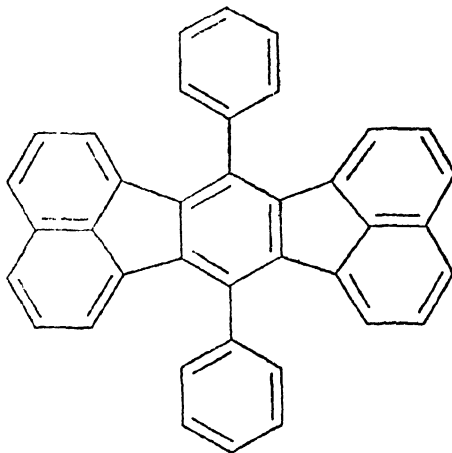
Tri- α -naphthylenephenylene-ethene
(a)

M. P., °C

300²²

(a) The structure of this compound was not clearly defined in the literature.

2,3,5,6-Di-(2',1'-acenaphtho)-1,4-
diphenylbenzene



M. P., °C

403⁵

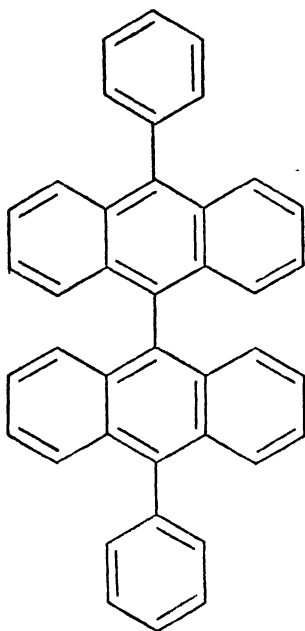


Tetranaphthyl (a)

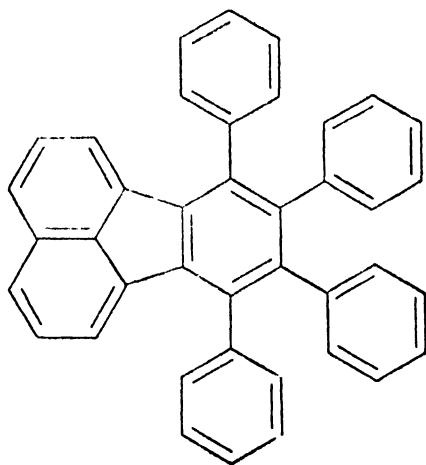
M. P., °C

235¹

(a) The structure of this compound was not clearly defined in the literature.

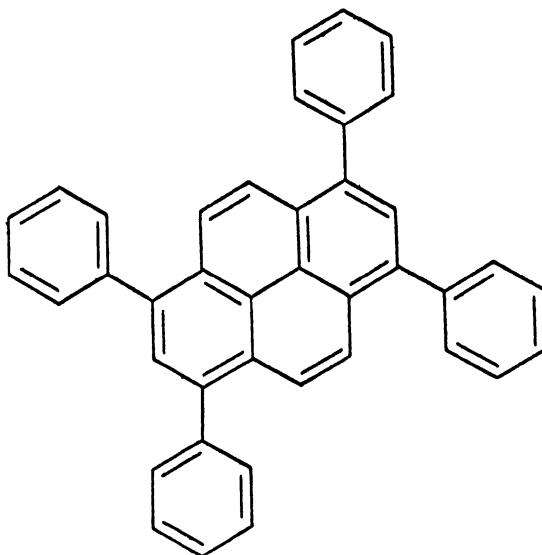
9,9'-Bi-(10-phenylanthryl)

M. P., °C
390-391^s

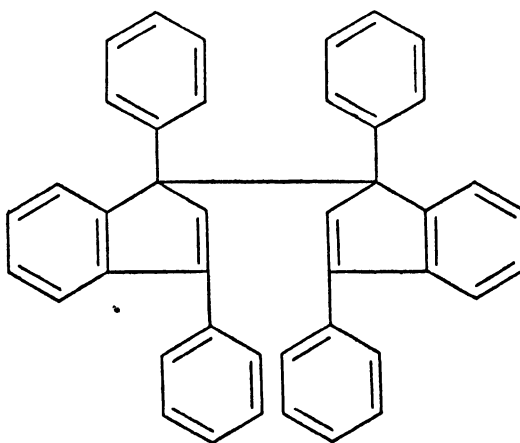
1,2,3,4-Tetraphenyl-5,6-(2',1'-acenaphtho)-benzene

M. P., °C
314^s

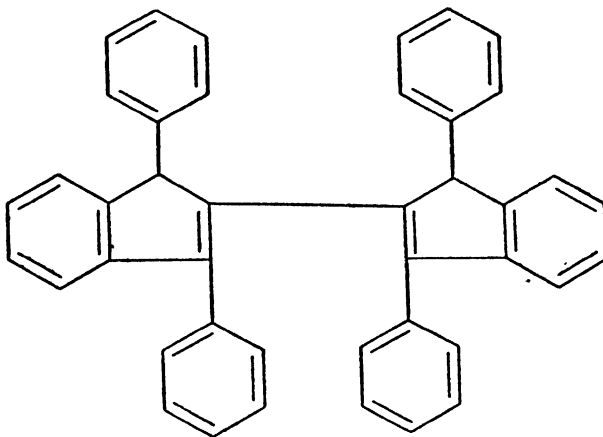
This series continued on next page

1,3,6,8-Tetraphenylpyrene

M. P., °C
299–300²³

1,1'-Bi-(1,3-diphenylindenyl)

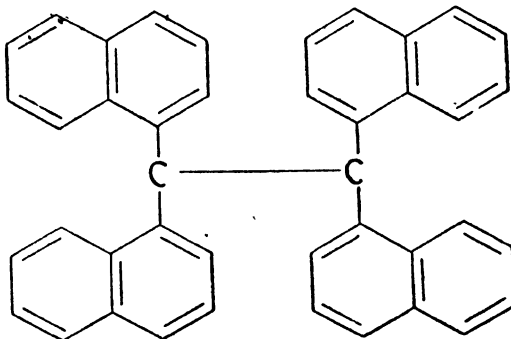
M. P., °C
195–196¹⁴
190–191¹⁵

2,2'-Bi-(1,3-diphenylindenyl)

M. P., °C

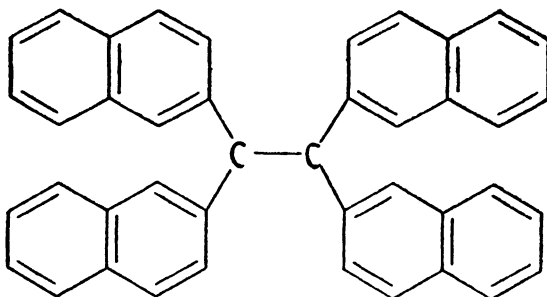
249-250 (a)⁷224-225 (a)⁷

(a) These constants were determined
on stereoisomers.

1,1,2,2-Tetra-(1'-naphthyl)-ethane

M. P., °C

285-286³⁰277^{3, 4}276-277³⁵

1,1,2,2-Tetra-(2'-naphthyl)-ethane

M. P., °C
273.5¹⁹

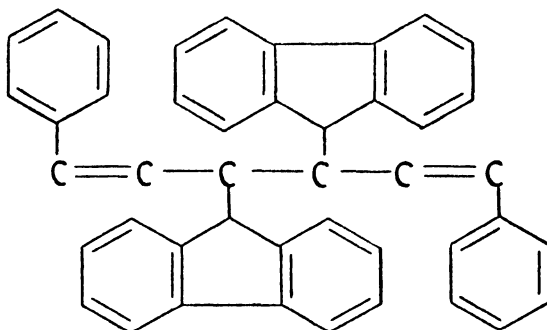
x₄-Tetraphenyl-x, x-dihydronaphthacene (a)
(Tetraphenyldihydorrubene)

M. P., °C
230-231⁶

(a) The structure of this compound was not clearly defined in the literature.



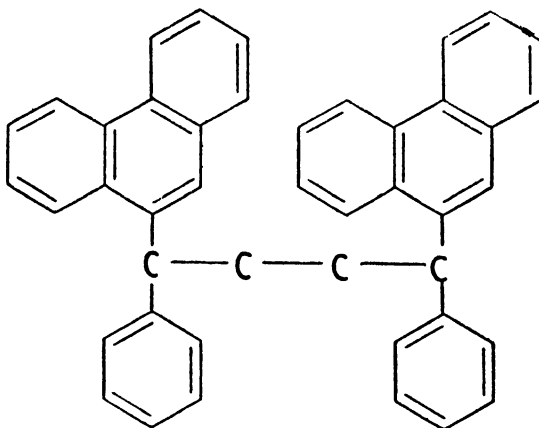
1,6-Diphenyl-3,4-di-(9'-fluoryl)-hexadiene-1,5



M. P., °C
204 (a)¹⁸
160-161 (a)²¹

(a) These constants were determined on isomeric forms.

**1,4-Diphenyl-1,4-di-(9'-phenanthryl)-
butane**



M.P., °C
243.5²

*References on Polynuclear Aromatics of
Empirical Formula C_nH_{2n-14}*

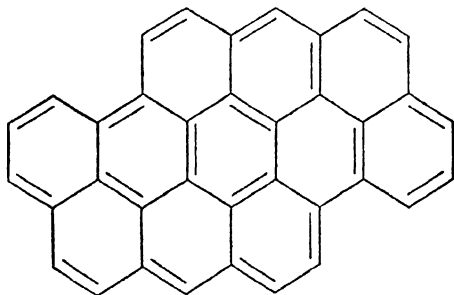
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XXVI. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-6}

XXVI. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-56}

$C_{36}H_{16}$

Dinaphtho-[2,1,8-bcd,2',1',8'-klm]-
coronene



Additional Data

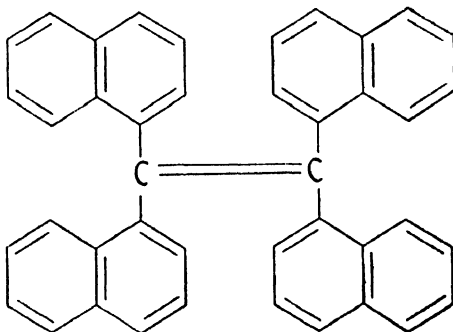
Sublimation Temp. ($^{\circ}C$)

ca 500

1 mm¹⁸

$C_{42}H_{28}$

1,1,2,2-Tetra-(1'-naphthyl)-ethene

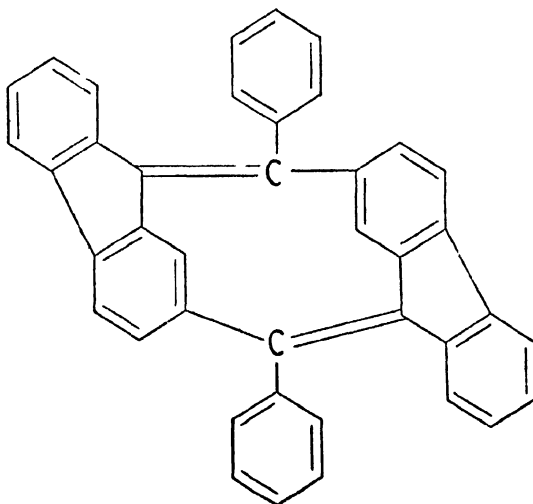


M. P., $^{\circ}C$

322^{3, 13}

$C_{40}H_{24}$

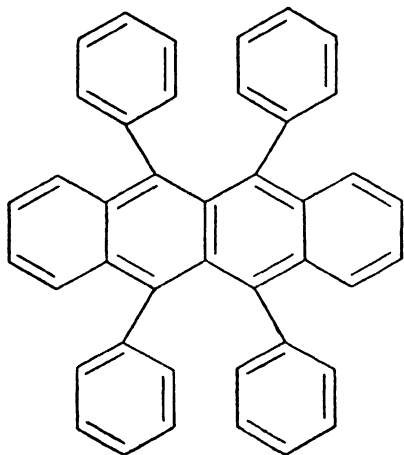
Difluoro-[2',1',9'-abc,2'',1'',9''-
fgh]-5,10-diphenylcyclodec-
adiene-4,9



M. P., $^{\circ}C$

225¹¹

5,6,11,12-Tetraphenylnaphthacene
(Rubrene) (a)
(Tetraphenylrubene)



M. P., °C

333

335^{1, 9}

334^{7, 9}

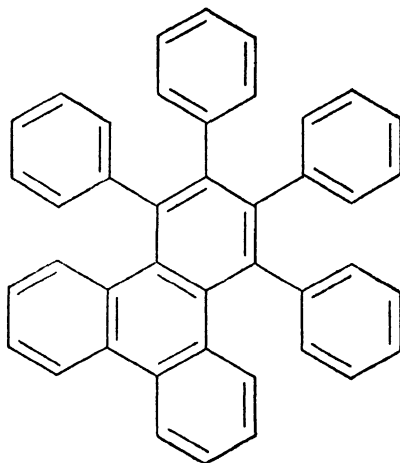
332²⁰

331^{12, 14, 18}

330²

- (a) This compound was thought by some investigators to be 2,2'-Bi-(1,3-diphenyl-4,5-benzocyclopentadien-3,5-ylidene). However, later work indicates that the above structure is correct.

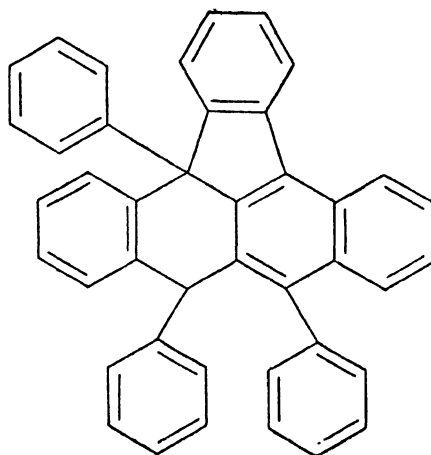
1,2,3,4-Tetraphenyltriphenylene



M. P., °C

292-293⁴

Indo-[1',2',3'-op]-5,6,11-triphenyl-6,11-dihydronaphthacene
(Pseudorubrene)



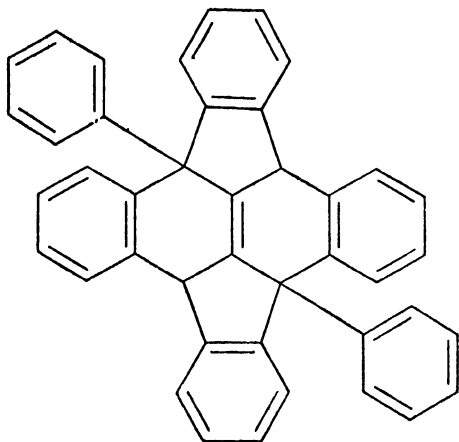
M. P., °C

278^{1, 9}

210 (a)¹⁶

- (a) This compound remelts at 278.

Diindano-[3',2',1'-fg,3'',2'',1''-op]-
5,11-diphenyl-5,6,10,11-tetra-
hydronaphthacene



M. P., °C

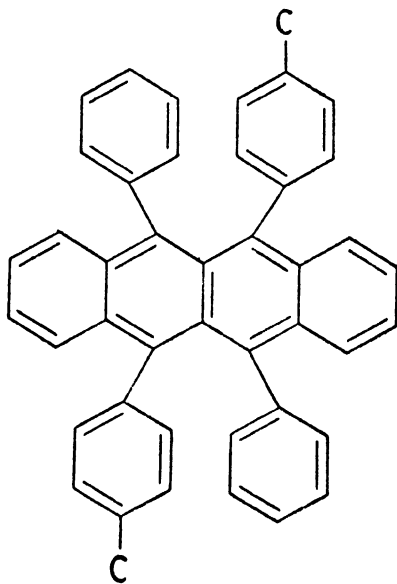
338 (a)¹

302 (a)¹

(a) These constants were determined
on stereoisomers.

$C_{42}H_{28}$

5,11-Diphenyl-6,12-di-*p*-tolynaphtha-
cene
(Bis-*p*-tolyl-diphenylrubene)
(Dimethylrubene)

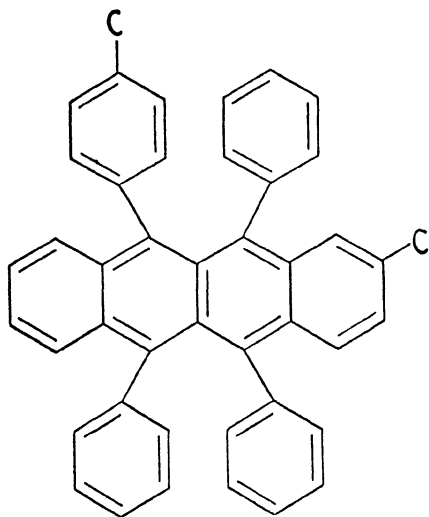


M. P., °C

205⁵

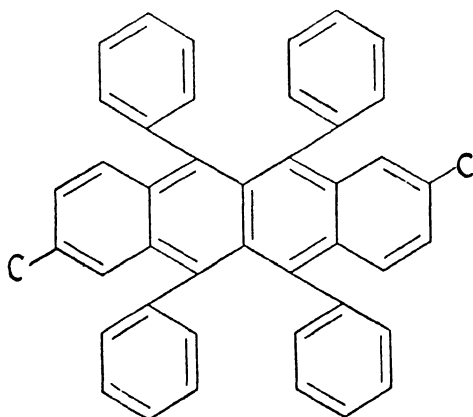
This series continued on next page

2-Methyl-5,6,12-triphenyl-11-*p*-tolynaphthacene
(Dimethylrubrene)



M. P., °C 273⁵

2,8-Dimethyl-5,6,11,12-tetraphenyl-naphthacene
(Dimethylrubrene)



M. P., °C
321⁵
315 (a)^{17, 19}

- (a) The structure of this compound was not clearly defined in the literature.

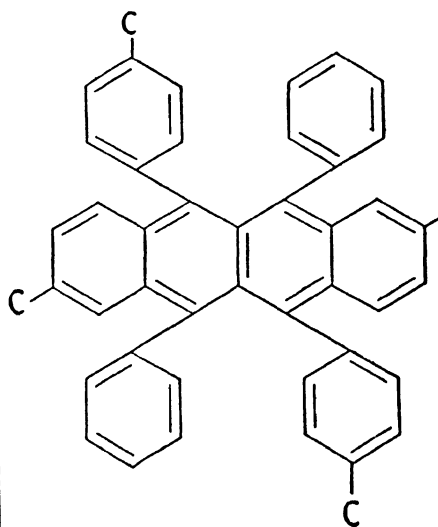
Pseudobis-(*p*-tolyl)-diphenylnaphthacene (a)

M. P., °C
291-295 (b)⁹
293-294 (b)¹⁰
271-272 (b)^{9, 10}

- (a) The structure of this compound was not clearly defined in the literature.
(b) There constants were determined on isomeric forms.

C₁₆H₃₆

2,8-Dimethyl-5,11-di-*p*-tolyl-6,12-diphenylnaphthacene
(Dimethyldiphenylditolylrubene)



M. P., °C
242⁶

**x₁₂-Dodecahydrofluorocyclene (a)**

M. P., °C

326^s

(a) The structure of this compound was not clearly defined in the literature.

References on Polynuclear Aromatics of Empirical Formula C_nH_{2n-56}

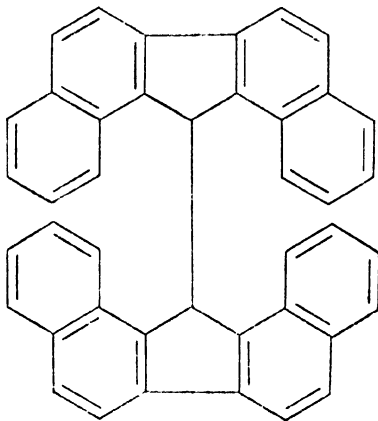
1. Badoche, M., Ann. chim. [10] **20**, 200 **1933**.
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3. Chichibabin, A. E., and O. I. Magidson, J. prakt. Chem. [2] **90**, 168 **1914**.
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XXVII. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n} 53

XXVII. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-58}

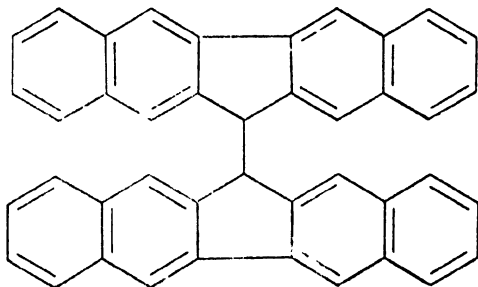
$C_{42}H_{26}$

9,9'-Bi-(1,2,7,8-dibenzofluoryl)



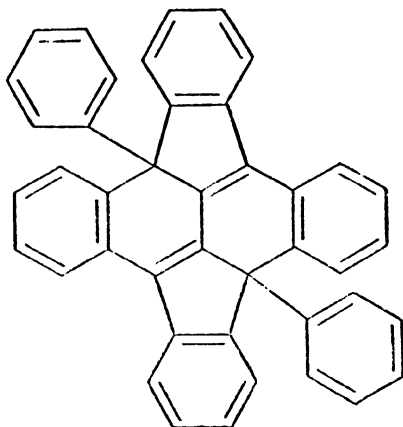
M. P., °C
353-355⁷.

9,9'-Bi-(2,3,6,7-dibenzofluoryl)



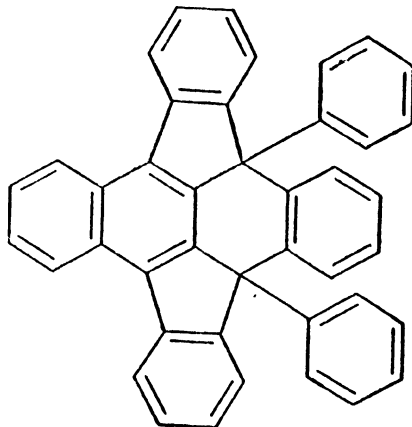
M. P., °C
310³

Diindo-[1',2',3'-fg,1'',2'',3''-op]-
5,11-diphenyl-5,11-dihydro-
naphthacene
(Dehydrorubrene)



M. P., °C
455²

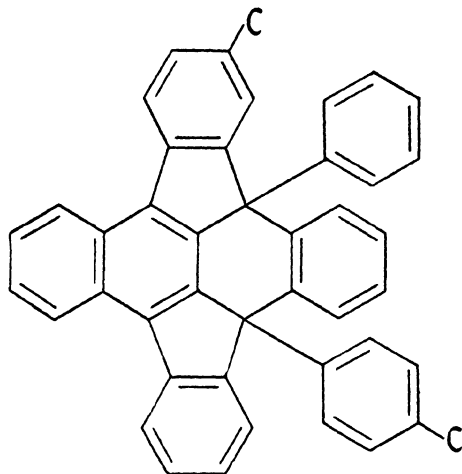
Diindo-[1',2',3'-fg,3'',2'',1''-op]-
5,12-diphenyl-5,12-dihydronaphtha-
cene
(Dehydrorubrene)



M. P., °C

430^s427-428⁴*This series continued on next page* $C_{44}H_{30}$

Indo-[1',2',3'-fg]-(6''-methylindo)-
[3'',2'',1''-op]-5-*p*-tolyl-12-
phenyl-5,12-dihydronaphthacene



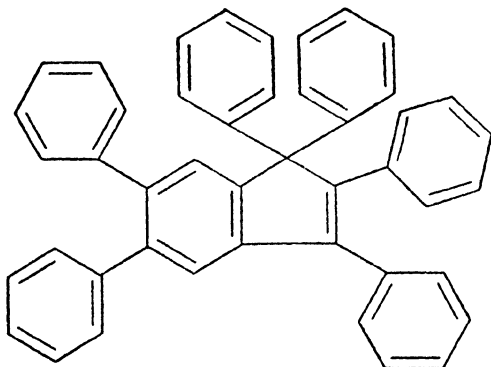
M. P., °C

340 (a)^s

(a) This compound remelts at 370.

 $C_{45}H_{32}$

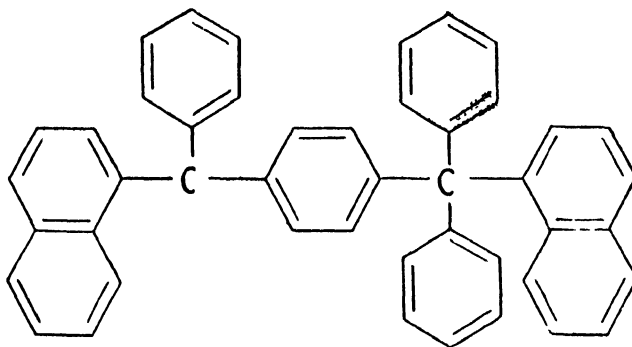
1,1,2,3,5,6-Hexaphenylindene



M. P., °C



1-(1'-Naphthylphenylmethyl)-4-(1'-
naphthyl-diphenylmethyl)-ben-
zene (a)



M. P., °C
234-235⁶

(a) The structure of this compound
was not clearly defined in the
literature.

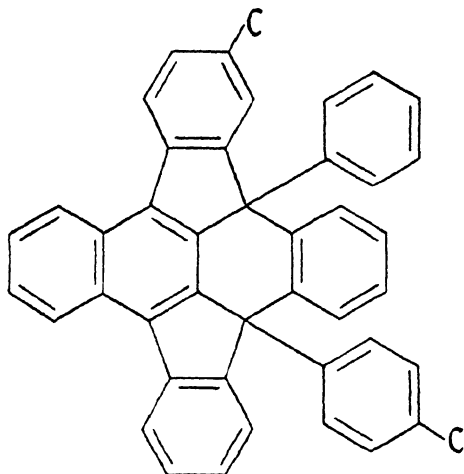
*References on Polynuclear Aromatics of
Empirical Formula C_nH_{2n-55}*

1. Allen, C. F. H., and J. W. Gates, Jr., J. Am. Chem. Soc. **65**, 2129 **1943**.
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4. Dufraisse, C., and L. Velluz, Bull. soc. chim. [5] **3**, 1905 **1936**.
5. Enderlin, L., Ann. chim. [11] **10**, 5 **1938**.
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8. Vansheidt, A. A., J. Russ. Phys. Chem. Soc. **58**, 69 **1926**; C. A. **21**, 581 **1927**; Chem. Zentr. **1926**, II, 2428.

M. P., °C

430⁵427-428⁴*This series continued on next page* $C_{44}H_{30}$

Indo-[1',2',3'-fg]-(6''-methylindo)-

[3'',2'',1''-op]-5-*p*-tolyl-12-phenyl-5,12-dihydronaphthacene

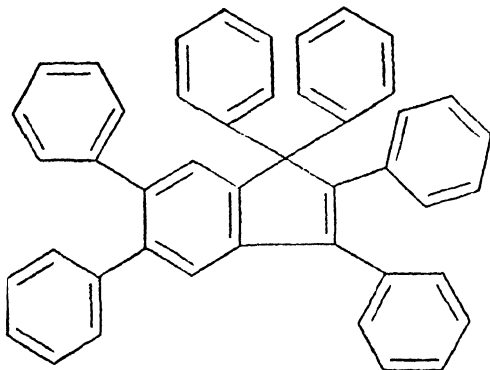
M. P., °C

340 (a)⁵

(a) This compound remelts at 370.

 $C_{46}H_{32}$

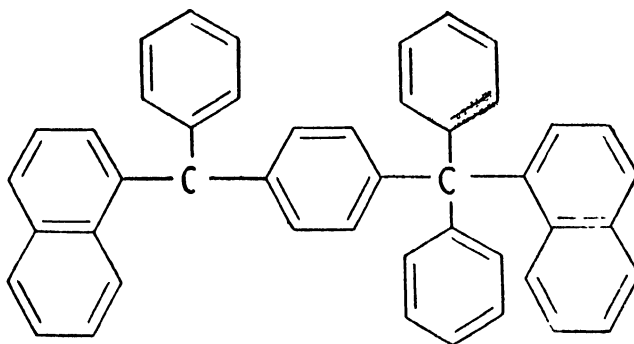
1,1,2,3,5,6-Hexaphenylindene



M P. °C



1-(1'-Naphthylphenylmethyl)-4-(1'-
naphthylphenylmethyl)-ben-
zene (a)



M. P., °C
234-235^a

(a) The structure of this compound
was not clearly defined in the
literature.

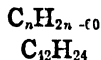
*References on Polynuclear Aromatics of
Empirical Formula C_nH_{2n-58}*

1. Allen, C. F. H., and J. W. Gates, Jr., J. Am. Chem. Soc. **65**, 2129 **1943**.
2. Badoche, M., Ann. chim. [10] **20**, 200 **1933**.
3. Cook, J. W., and R. W. G. Preston, J. Chem. Soc. **1944**, 553.
4. Dufraisse, C., and L. Velluz, Bull. soc. chim. [5] **3**, 1905 **1936**.
5. Enderlin, L., Ann. chim. [11] **10**, 5 **1938**.
6. Gomberg, M., and C. S. Schoepfle, J. Am. Chem. Soc. **41**, 1655 **1919**.
7. Vansheidt, A., Ber. **59**, 2092 **1926**.
8. Vansheidt, A. A., J. Russ. Phys. Chem. Soc. **58**, 69 **1926**; C. A. **21**, 581 **1927**; Chem. Zentr. **1926**, II, 2428.

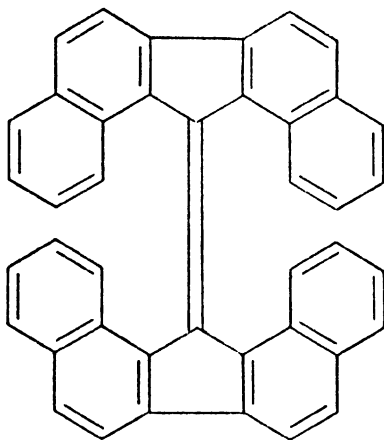
XXVIII. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-60} to 88

-

XXVIII. POLYNUCLEAR AROMATICS OF EMPIRICAL
FORMULA C_nH_{2n-60} to 88



9,9'-Bi-(1,2,7,8-dibenzofluorylidene)
(a)



M. P., °C
357²⁴
308-310^{18, 19}

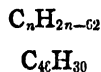
- (a) The structure of this compound was not clearly defined in the literature.



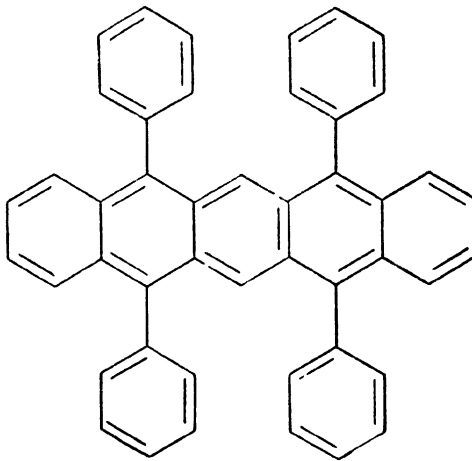
x_8 -Octahydrofluorocyclene (a)

M. P., °C
336-337⁹

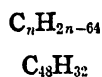
- (a) The structure of this compound was not clearly defined in the literature.



5,7,12,14-Tetraphenylpentacene



M. P., °C
306-308¹



x_4 -Tetrahydrofluorocyclene (a)

M. P., °C
348-349⁹

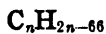
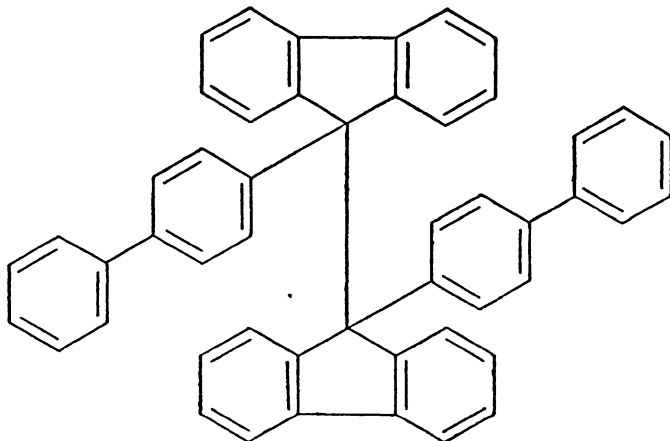
- (a) The structure of this compound was not clearly defined in the literature.



1,3-Diphenyl-9-(x', x', x'-triphenyl-phenyl)-fluorene (a)

M. P., °C
221¹⁵

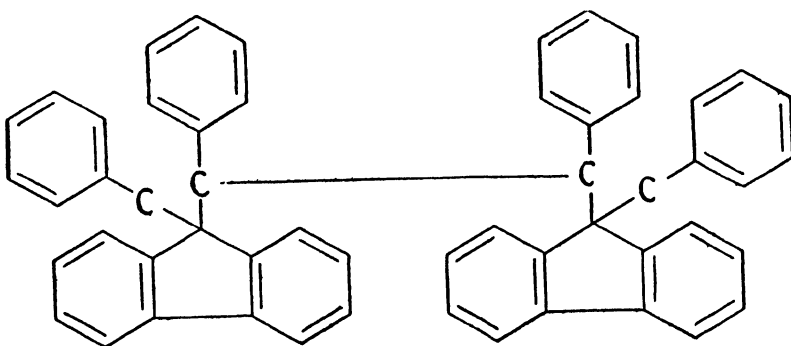
- (a) The structure of this compound was not clearly defined in the literature.

9,9'-Bi-(9-*p*-biphenylfluoryl)

M. P., °C
175-176²³



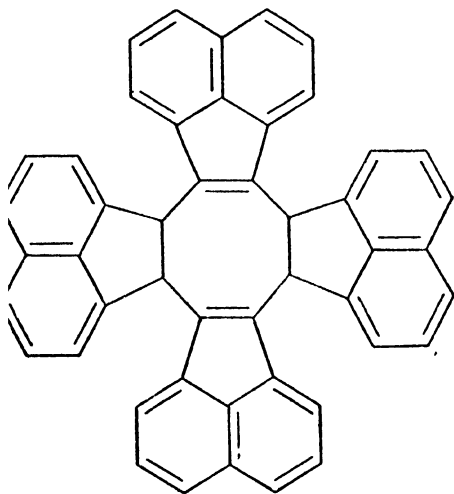
1,2-Diphenyl-1,2-di-[9'-(9'-benzylfluoryl)]-ethane



M. P., °C
304-306²²



1,2,3,4,5,6,7,8-Tetra-(2',1'-
acenaphtheno)-cyclooctadiene-
1,5 (a)
(Fluorocyclene)

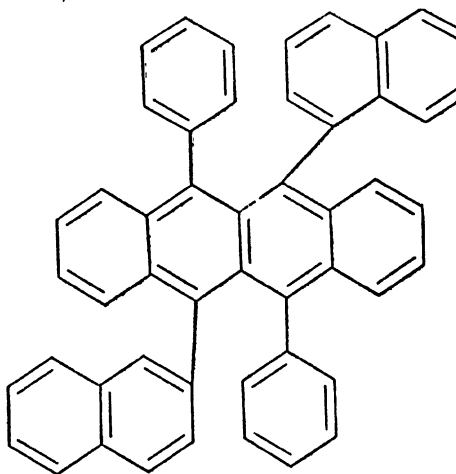


M. P., °C
396-397^{9, 12}
395-396¹⁰

(a) The double bonds may be in the 2-
and 6-positions.



5,11-Diphenyl-6,12-di-(2'-naphthyl)-
naphthacene (a)



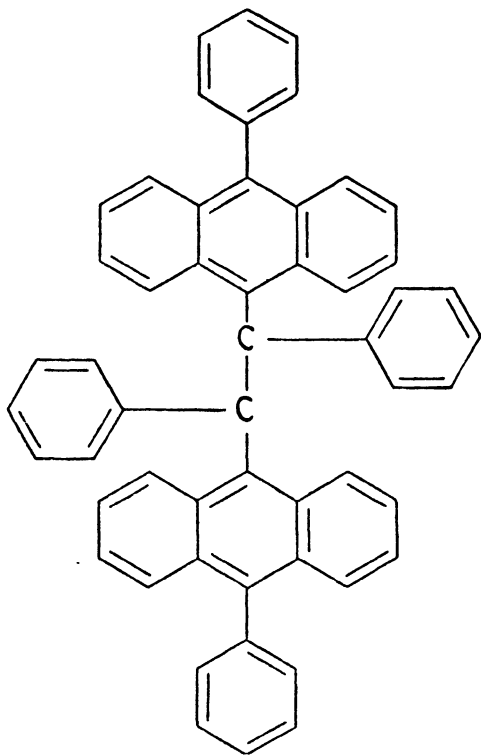
M. P., °C
280^{20, 25}

(a) This compound was named
Dibenzorubrene in the literature.

This series continued on next page



1,2-Diphenyl-1,2-di-[9'-(10'-phenyl-anthryl)]-ethane (a)

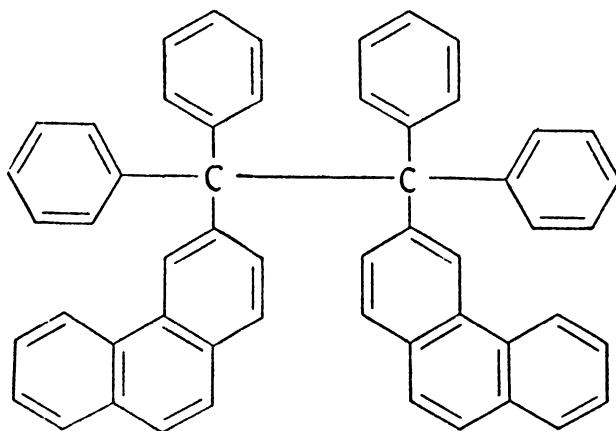


M. P., °C
252-253¹⁴

(a) The structure of this compound was not clearly defined in the literature.

This series continued on next page

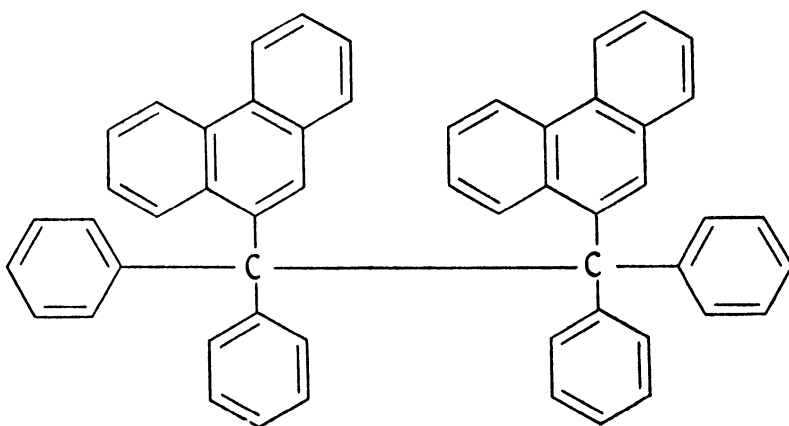
1,1,2,2-Tetraphenyl-1,2-di-(3'-phenanthryl)-ethane



M. P., °C
150-152 (a) (in nitrogen)²

(a) This compound melts with decomposition.

1,1,2,2-Tetraphenyl-1,2-di-(9'-phenanthryl)-ethane



M. P., °C
223-225 (in nitrogen)²¹
210-212²¹

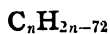


Di-[α -(α' -fluorylmethylfluoryl)]-
methane (a)

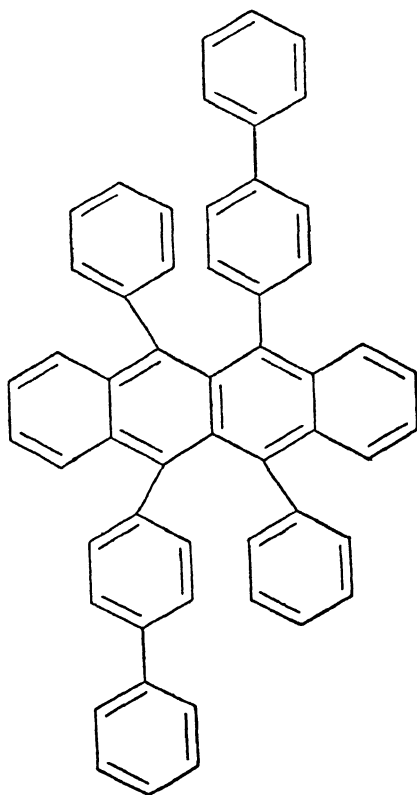
M. P., °C

246-247¹¹

(a) The structure of this compound
was not clearly defined in the
literature.



5,11-Diphenyl-6,12-di-*p*-biphenyl-
naphthacene



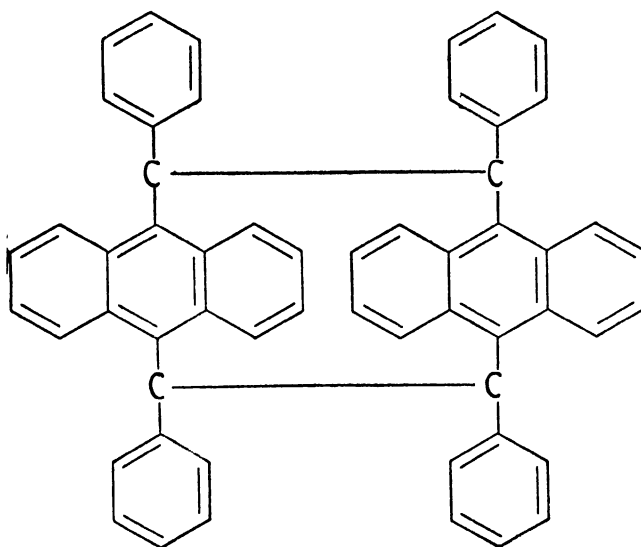
M. P., °C

317⁴

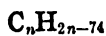
This series continued on next page



1,2,3,4-Tetraphenyl-1,2,3,4-diendo-
(9',10'-anthracene)-cyclobutane



M. P., °C
184^{16, 17}



**x,x-Di-[x'-(phenanthryl)-phenyl-
methyl]-phenanthrene (a)**

M. P., °C
195-197¹³

(a) The structure of this compound was not clearly defined in the literature.

This series continued on next page

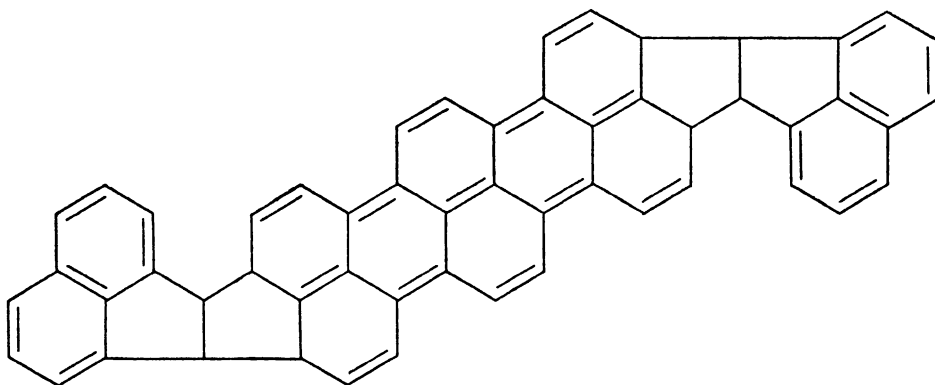
C_4H_{12}

536

C_nH_{2n-76}

$C_{34}H_{32}$

Leucacene

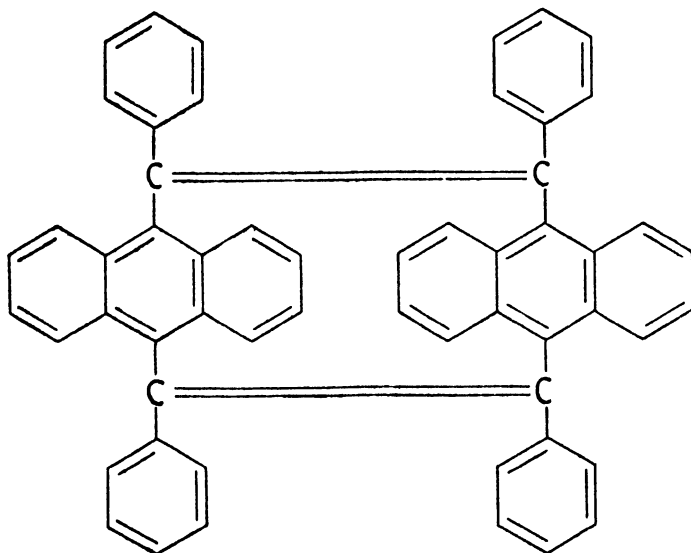


M. P., °C

250-252^{b, 6}

$C_{56}H_{36}$

1,2,3,4-Tetraphenyl-1,4,2,3-diendo-
(9',10'-anthracene)-cyclobuta-
diene-1,3

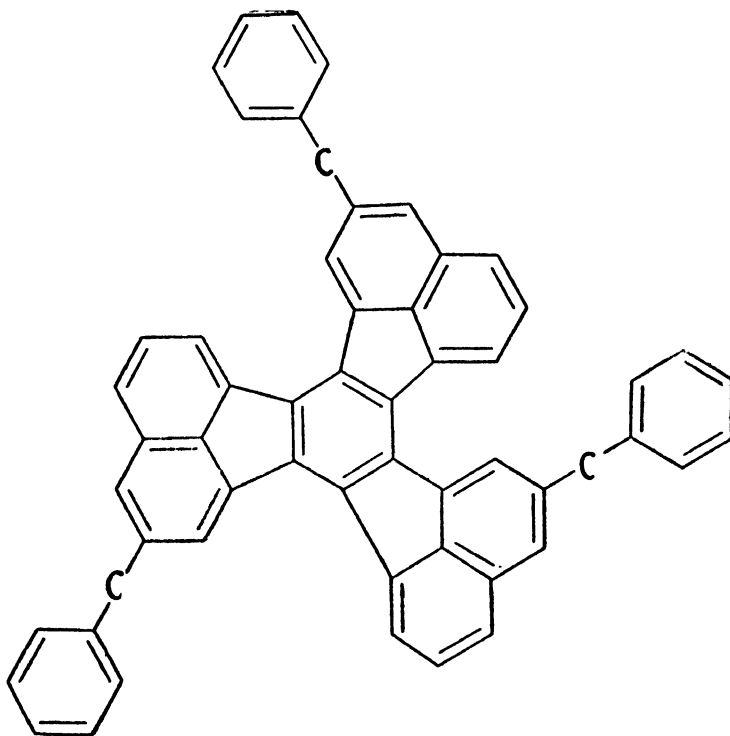


M. P., °C

197¹⁶

C_nH_{2n-78} $C_{67}H_{36}$

1,2,3,4,5,6-Tri-[2',1'-(4'-benzyl-
acenaphtho)]-benzene

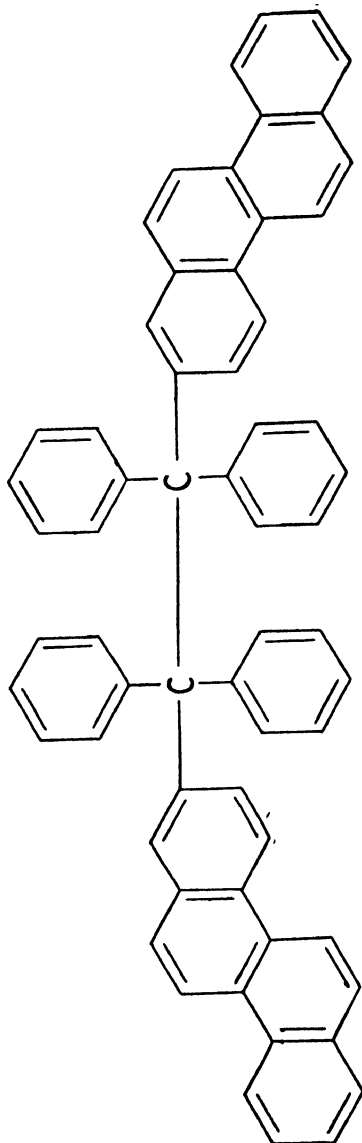


M. P., °C
270⁸
267-270⁷

This series continued on next page

C_nH_{2n-32} $C_{62}H_{42}$

1,1,2,2-Tetraphenyl-1,2-di-(2'-
chrysyl)-ethane

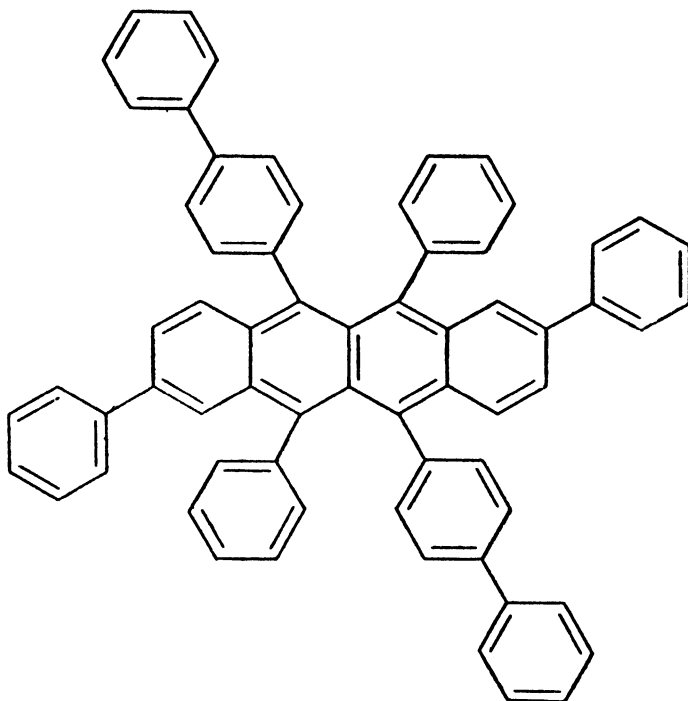


M. P., °C
239²¹

This series continued on next page



2,6,8,12-Tetraphenyl-5,11-di-*p*-
biphenylnaphthacene



M. P., °C
320 (a)³

(a) This compound remelts at 380.

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Empirical Formula C_nH_{2n-88} to 88

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